

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF TEXAS
CORPUS CHRISTI DIVISION

THE ARANSAS PROJECT,
Plaintiff,

VS.

BRYAN SHAW, et al.,
Defendants.

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Case No. 2:10-cv-075

MEMORANDUM OPINION AND VERDICT OF THE COURT

This case was tried to the Court over an eight-day period on December 5, 6, 7, 8, 9, 13, 14, and 15, 2011.¹ As required by Rule 52(a) of the Federal Rules of Civil Procedure, the Court makes the following findings of fact and conclusions of law thereon.²

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¹Defendants and intervenors moved to reopen the case to introduce new evidence. (D.E. 328). As discussed herein, the Court considered the new evidence but found it flawed and preliminary, and not persuasive, and consequently, on December 6, 2012, denied the motion to reopen as moot.

²Any finding of fact made herein that also constitutes a conclusion of law is adopted as a conclusion of law. Any conclusion of law made herein that also constitutes a finding of fact is adopted as a finding of fact. All findings of fact and conclusions are made by a preponderance of the evidence.

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I. INTRODUCTION.

In the annals of conservation, the return of the Whooping Crane from the brink of extinction is one of the most fabled stories. In the 1940's, less than fifteen of these remarkable birds – the tallest in North America and the rarest species of crane in the world – remained. With the creation of wildlife refuges and other conservation efforts, the population of the birds has slowly risen to, including both those in captivity and those not in captivity, to around 500 birds. At issue here is the threat of extinction to the non-captivity population of around 300. However, the “whoopers” are still at risk, as development and environmental issues continue to threaten their habitat.

This case concerns the world's only self-sustaining, wild Whooping Crane population, known as the “AWB” flock,³ and its winter home in South Texas at the Aransas National Wildlife Refuge (the “Refuge”), and surrounding estuarine areas that comprise the AWB cranes' critical winter habitat.⁴ The AWB cranes normally begin to arrive at their winter habitat in late October, and depart in early April of the following year.

The Aransas Refuge is located midway along the Texas Gulf coast, about 140 miles south of Houston and 50 miles north of Corpus Christi.⁵ The cranes' wintering grounds are comprised of approximately 9,000 hectares of salt flats on the Refuge itself and also on adjacent islands,

³ The flock takes its name from the two protected preserves where the cranes live most of their lives, migrating annually between their breeding grounds in Wood Buffalo National Park, Canada, and their winter home in Texas.

⁴ See Court's Exhibit 1, Map of AWB flock's wintering area, attached hereto. The cranes' winter habitat extends beyond the borders of the Refuge, but as used herein, the term “Refuge” implies the cranes' critical winter habitat.

⁵ The Aransas Refuge was established on December 31, 1937 as “a breeding ground for migratory birds and other wildlife ...” The Refuge is most notably known for being the winter home of the endangered Whooping Crane.

including the Blackjack Peninsula, San Jose Island, and Matagorda Island.⁶ The area is bordered on the east by the Gulf of Mexico, receiving daily impulses of salt water with the changing of the tides.

The Refuge receives freshwater inflows from primarily two river sources, the San Antonio and the Guadalupe, each located to the north and slightly west of the area.⁷ The San Antonio river flows into the Guadalupe river system, and the Guadalupe river flows directly into the Refuge, emptying into the San Antonio bay. The area where the freshwater enters the Refuge is referred to correctly as the “Guadalupe estuary,” but it is known also as the “San Antonio bay.”⁸ The San Antonio and the Guadalupe river systems emerge from underground springs near San Antonio and run 250 miles southeast where they join together just before entering the San Antonio bay and flow into the AWB flock’s winter habitat, that extends slightly north of the Refuge.⁹ These freshwater inflows come from a combination of spring flows and rainfall. Id.

Whooping Cranes face extinction. Indeed today, it is estimated that only 500 Whooping Cranes exist worldwide. In 1967, the United States listed the Whooping Crane as threatened with extinction, 32 Fed. Reg. 4001 (Mar. 11, 1967), and in 1970, they were listed as endangered,

⁶ The Refuge is comprised of five units: (1) Aransas Unit/Blackjack Peninsula (47,261 acres); (2) Tatton Unit (7,568 acres); (3) Lamar Unit (979 acres); (4) Myrtle Foester Whitmire Unit (3,440 acres); and (5) Matagorda Island Unit (56,683 acres). See Court’s Ex. 1. See also PX-385 at 1-3.

⁷ See PX-63, Diagram of Texas rivers and corresponding estuaries.

⁸ TAP witness, Dr. Paul Montagna explained that an estuary is defined as the area “where the river meets the sea,” beginning at the mouth of the river and continuing to the “pass” where the open ocean begins. (Montagna, Day 3, Tr 184-185). The estuary is named for its river source, so in this case, the Refuge is part of the Guadalupe estuary. Id. However, certain federal agencies, including the National Oceanic and Atmospheric Administration (NOAA) refer to the area by the primary bay name, in this case, the San Antonio bay. Id. Tr 186. To avoid confusion, the Court will refer to the system as the San Antonio bay/Guadalupe estuary. Portions of the Aransas Refuge are situated in the San Antonio bay/Guadalupe estuary, and the entire area comprises the AWB flock’s critical habitat.

⁹ See PX-109 at 13, Refuge Annual Report (2004).

35 Fed. Reg. 16047 (Oct. 13, 1970). In 1973, both of these classifications were “grandfathered” into the Endangered Species Act. 16 U.S.C. § 1531, et seq., 87 Stat. 884.

Beginning in 1950, the United States Fish & Wildlife Service (USFWS) employed aerial surveys to provide an annual census of how many AWB cranes arrived at the Refuge in the fall, and how many departed in the spring. Mr. Tom Stehn, a USFWS biologist, worked at the Refuge for over 29 years, and personally developed and implemented a method to count the individual birds of the AWB flock utilizing the cranes’ well-documented behaviors of site fidelity, site tenacity, and crane territoriality.¹⁰ Because specific birds returned to their specific locations, Mr. Stehn was able to map their territories and to confirm their presence or absence with weekly aerial surveys.¹¹ Based on his intimate knowledge of the AWB crane and his mapping of their territories, Mr. Stehn concluded that, at the start of the 2008 winter season, the AWB flock had grown to its peak number of 270 birds, plus or minus 2 to 3 percent.

During the 2008-2009 winter, there was a severe drought. As the winter progressed, the AWB cranes began to demonstrate unusual behavior. For example, parents would deny their juveniles food, and the birds began venturing out of their specific territories in search of food and

¹⁰ “Site fidelity” is the tendency of a migrating bird to return to the same established territory each year with boundaries similar to the year before. (Chavez-Ramirez, Day 2, Tr 84; Stehn, Day 2, Tr 322). In birds, “territoriality” is defined as a space that is defended by either an individual, a pair, or a family unit against other members of the same species for at least some portion of their annual cycle. (Chavez-Ramirez, Day 2, Tr 82-83). “Site tenacity” is similar to “site fidelity” but suggests that, once the bird has returned to its established territory, it will not establish a new territory that season. *Id.* Tr 87. Of course, none of these behaviors suggest that the Whooping Cranes will not freely move about the entire Refuge area.

¹¹ Of the fifteen species of cranes in the world, only the Whooping Crane is territorial on its winter grounds. Mated pairs, some with juveniles, return to the Refuge each winter to specific staked territories. These territories have been mapped and used by the USFWS to conduct crane population counts. Indeed, one male crane, referred to as “Daddy Lobstick,” has returned to the same territory for thirty years.

fresh water. When the cranes first arrive at the Refuge, it is normal for the parents to feed the juvenile. The juveniles' beaks are soft and tender, and it is necessary for the parent to break the shell and feed the crab to the begging juvenile. As the winter progresses, the parent pulls the crab from the water, kills it, and leaves it for the juvenile. During the 2008-2009 winter, Dr. Chavez-Ramirez observed a parent aggressively pushing his juvenile away from a crab that had been caught. He had never seen a parent deny food to a begging juvenile. Such behavior indicates that the parent was under food stress. The birds' behavior was so alarming that Mr. Stehn contacted Dr. Chavez-Ramirez, a biologist with two decades of field research on the AWB cranes and a member of the International Whooping Crane Recovery Team, and asked him to visit the Refuge and observe the cranes. Dr. Chavez-Ramirez was equally troubled and concerned with his observations of the cranes' behavior. Both he and Mr. Stehn observed that the lack of freshwater inflows had increased salinities across the Refuge. These hyper-saline conditions, verified by field measurements, led to a decrease in blue crabs and wolfberries, the staple diet of the AWB flock. This food shortage led to bird emaciation, stress behavior, and an over-all decline in bird health. That is, without proper freshwater inflows, the AWB's critical habitat had been thrown out of balance, with ramifications up and down the food chain. That winter, at least 23 AWB cranes, or 8.5 % of the AWB flock, died at the Refuge. Another 34 birds that left Texas in spring, failed to return in fall.

After news of the high crane mortality in the 2008-2009 winter became known, certain environmentalists, local coastal business owners, bird enthusiasts, and others formed "The Aransas Project," ("TAP"), a Texas nonprofit corporation. The TAP members have a direct

interest in the AWB Whooping Cranes and the ecological health of the San Antonio, Carlos, Mesquite, and Aransas bays that connect to the Refuge.

The State of Texas owns its surface water, and this includes the water in the Guadalupe and the San Antonio River systems. Under Texas law, freshwater capture and use is regulated by the Texas Commission on Environmental Quality (TCEQ), a State agency. Through its permit process and regulatory powers, the TCEQ can affect the availability of freshwater to users along the river system.

Prior to filing this lawsuit, TAP petitioned the TCEQ for a water permit to require a certain amount of freshwater to remain instream in the Guadalupe and San Antonio river systems to ensure that sufficient amounts of freshwater reached the Refuge and surrounding areas adjacent to the San Antonio bay that comprise the critical habitat of the AWB cranes. TAP's permit request was denied, and on December 7, 2009, TAP gave notice of its intent to sue.

On March 10, 2010, TAP filed this lawsuit alleging that the TCEQ defendants had violated Section 9 of the Endangered Species Act (ESA), 16 U.S. C. § 1531 et seq., by failing to properly manage freshwater inflows into the San Antonio and Guadalupe bays during the 2008-2009 winter, causing an unlawful “take” of AWB cranes. (D.E. 1). TAP maintains that the TCEQ defendants’ water management practices during 2008-2009, combined with the severe drought, drastically modified the AWB cranes’ critical habitat making it hyper-saline. In turn, the hyper-saline conditions caused a reduction in the availability of wolfberries and blue crabs, the cranes’ primary food resources, as well as in fresh drinking water. The lack of food and freshwater caused the cranes to become emaciated and to engage in stress behavior. Emaciation led to increased illness and disease susceptibility, and the cranes’ unusual stress behaviors,

including leaving the safety of their site territories, contributed to increased predation. In total, the adverse modification of the cranes' critical habitat effectively caused the death of at least 23 Whooping Cranes that winter season, constituting a "take" under the ESA.

TAP named as defendants TCEQ officials Bryan Shaw, Buddy Garcia, Carlos Rubinstein, and Mark Vickery, and also, the South Texas Watermaster, Al Segovia.¹² The Guadalupe-Blanco River Authority (GBRA) was granted leave to intervene. (D.E. 31, 35). Numerous other parties sought leave to intervene: Union Carbide Corporation (D.E. 45); Texas Farm Bureau (D.E. 51); Texas Chemical Council (D.E. 53); San Antonio Water System (D.E. 59); San Antonio City Public Service (D.E. 70); and the San Antonio River Authority (SARA) (D.E. 110). The Court granted Texas Chemical Council's motion to intervene, but denied the others.¹³ (D.E. 86, 112). On appeal, the Fifth Circuit allowed the intervention of the SARA, but affirmed the denial of intervention of the other parties. (D.E. 182, 183).

Through this lawsuit, TAP is requesting declaratory and injunctive relief to ensure that the AWB flock has sufficient water resources to prevent future "takings." (D.E. 1 at 32-33).

II. STATUTORY FRAMEWORK.

A. The Endangered Species Act.

¹²Defendants are named in their official capacities. Bryan Shaw is the Chairman of the TCEQ, Carlos Rubinstein is a Commissioner and Buddy Garcia is a former Commissioner of the TCEQ. Mark Vickery is a former Executive Director of the TCEQ and Al Segovia is a retired South Texas Watermaster.

¹³Various other parties have made Amicus Curiae appearances: City of Kerrville (D.E. 78); Upper Guadalupe River Authority (D.E. 82); CMC Steel Texas (D.E. 88); Bexar Metropolitan Water District (D.E. 102); East Central Special Utility District (D.E. 144); City of New Braunfels (D.E. 171); California Farm Bureau Federation, Oklahoma Farm Bureau Federation, Wyoming Farm Bureau Federation, Oregon Farm Bureau Federation, and American Farm Bureau Federation (D.E. 228).

Enacted in 1973, the Endangered Species Act (“ESA”) is an attempt to prevent the further elimination of animal species in the United States and to help those animal populations to increase. See 16 U.S.C. § 1531, et seq. The ESA’s stated purposes are “to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved... [and] to provide a program for the conservation of such endangered species and threatened species.” 16 U.S.C. § 1531(b). The plain intent of Congress in enacting this statute was “to halt and reverse the trend towards species extinction, whatever the cost.” Tennessee Valley Authority v. Hill, 437 U.S. 153, 184 (1978).

1. ESA § 9 prohibits “takes” of endangered species.

Under the ESA, the Secretary of the Interior (“Secretary”) is required to promulgate regulations listing those species of animals that are “threatened” or endangered” under specified criteria, and to designate their “critical habitat.” 16 U.S.C. § 1533. Section 9 of the ESA prohibits “takes” of all listed endangered species. 16 U.S.C. § 1531(a)(B); 50 C.F.R. § 17.31; 55 Fed. Reg. 26114 (June 26, 1990).¹⁴ The term “take” is defined as actions that “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect,” a protected species. 16 U.S.C. § 1532(19). The term “harm” includes “significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.” 50 C.F.R. § 17.3; Babbitt v. Sweet Home Chapter of Communities for a Great Oregon, 515 U.S. 687(1995). The term “harass” means “an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not

¹⁴As noted above, Whooping Cranes are considered endangered under the ESA. 16 U.S.C. § 1531, et seq., 87 Stat. 884.

limited to, breeding, feeding, or sheltering.” 50 C.F.R. § 17.3. Congress intended to define “take” in the “broadest possible manner to include every conceivable way” in which any person could harm or kill wildlife. S. Rep. No. 307, 93rd Cong., 1st Sess. 1, reprinted in 1973 U.S. Code Cong. & Admin. News 2989, 2995. In this case, the crux of TAP’s argument is that the TCEQ’s actions and inactions in managing water diversions along the San Antonio and Guadalupe River systems caused “harm” to the endangered Whooping Cranes, by actually injuring and killing 23 birds. 50 C.F.R. § 17.3 (the “harm” regulation).

The ESA’s prohibition against “takes” governs both the actions, and failure to act, by all “persons,” including any “officer, employee, agent, department, or instrumentality of ... any State.” 16 U.S.C. § 1532(13). The ESA prohibitions apply to actions by state agencies where their regulatory programs approve actions by third parties that contribute to causing the take. E.g., Animal Welfare Inst. v. Martin, 623 F.3d 19 (1st Cir. 2010) (citizens could challenge Maine’s authorization of foothold traps that harmed lynx); Strahan v. Coxe, 127 F.3d 155 (1st Cir. 1997) (challenging Massachusetts’ licensing of gill-net and lobster pot fishing as harming northern Right Whale); Loggerhead Turtle v. County Council of Volusia County, 148 F.3d 1231 (11th Cir. 1998) (ESA applies to citizen’s challenge of county’s refusal to ban beach driving during sea turtle nesting season); and Defenders of Wildlife v. EPA, 882 F.2d 1294 (8th Cir.1988) (challenging EPA and Secretary of Interior’s permitting of strychnine pesticides and rodenticides).

Section 9 prohibits indirect as well as deliberate “takes” of endangered species. Babbitt, 515 U.S. at 700; Strahan, 127 F.3d at 163. Ordinary requirements of proximate causation apply. Babbitt, 515 U.S. at 700, n.13 (O’Connor, J., conc.); see also Loggerhead Turtle, 148 F.3d at 1251

n.23 (“proximate cause is not the same thing as a sole cause,” citing Cox v. Administrator United States Steel & Carnegie, 17F.3d 1386, 1399 (11th Cir. 1994)). In fact, this Court has previously recognized in this case that proximate cause exists where a defendant government agency authorized the activity that caused the take. (See D.E. 270 at 15-16).

2. ESA § 10 addresses incidental takes.

Following the ESA’s enactment, it became apparent that certain activities might result in an unintended take of an endangered species. For example, clearing certain acreage for development might destroy the habitat of a protected species of bird. Thus in 1982, Congress amended the ESA to authorize the issuance of permits allowing the take of a protected species if the take is incidental to otherwise lawful private actions. 16 U.S.C. § 1539(a). Section 10 of the ESA provides, “The secretary may permit, under such terms and conditions as he shall prescribe,” any incidental taking otherwise prohibited by Section 9 that will not “appreciably reduce” the likelihood that the species will survive and recover. 16 U.S.C. § 1539(a)(1)(B), 2(B). A Section 10 “Incidental Take Permit” (“ITP”) is issued by the USFWS after development and submission of a Habitat Conservation Plan (“HCP”), which must be approved by the USFWS. 16 U.S.C. § 1539(a)(2)(A); (B). The HCP must include conservation measures designed to minimize and mitigate the impacts of taking species listed under the Act. 16 U.S.C. § 1539(a)(2)(A)(ii). In the absence of an ITP or other exemption, the ESA forbids each and every take. 16 U.S. C. § 1538(a)(1).

Recognizing that some human activities will necessarily encroach upon wildlife, and in some instances, involve endangered species, ESA § 10 offers a method by which the developer, applicant or entity works with the USFWS to anticipate the impact of their actions and to

minimize the potential take of an endangered species. Here, TAP is asking the Court to order the TCEQ defendants to apply for an ITP, thus acknowledging that their permit process and water enforcement actions, especially in times of drought, alter the critical habitat of the AWB cranes and can lead to a “take” of these endangered birds. Once the ITP is filed, ESA § 10 requires TCEQ defendants to work with the USFWS to formulate a Habitat Conservation Plan based on the best science available.

III. FINDINGS ON STANDING AND JURISDICTION.

A. Standing.

The ESA expressly authorizes citizen suits against any “person” alleged to be responsible for a “take.” The ESA provides that any person may commence a civil suit on his own behalf— (A) to enjoin any person, including the United States and its agencies, who is alleged to be in violation of ESA provisions or regulations; (B) to compel the Secretary to enforce the provisions concerning the taking of any resident endangered species or threatened species within any State; or (C) against the Secretary where there is an alleged failure of the Secretary to perform any nondiscretionary act or duty. 16 U.S.C. § 1540(g)(1); see also Tennessee Valley Auth., 437 U.S. at 184; Defenders of Wildlife v. Bernal, 204 F.3d 920, 925 (9th Cir. 2000). The district courts shall have jurisdiction, without regard to the amount in controversy or the citizenship of the parties, to enforce any ESA provision or regulation, or to order the Secretary to perform such act or duty, as the case may be. 16 U.S. C. § 1540(g). Although the ESA provides for citizens suits, the ESA plaintiff must satisfy the jurisdictional requirements of standing. Bennett v. Spear, 520 U.S. 152, 162 (1997). To satisfy the “case” or “controversy” requirement of Article III, which is the “irreducible constitutional minimum” of standing, a plaintiff must, demonstrate that he has

suffered: injury in fact; that the injury is “fairly traceable” to the actions of the defendant, and that the injury will likely be redressed by a favorable decision. Lujan v. Defenders of Wildlife, 504 U.S. 555, 560-561 (1992).

1. Injury in fact.

In this case, the TCEQ defendants, GBRA, and SARA, have consistently challenged TAP’s standing to sue. (See D.E. 213, 214, 215). In its December 5, 2011 Order denying TCEQ defendants’ and intervenor’s motion for partial summary judgment (D.E. 270), the Court found that TAP had satisfied the standing elements of injury in fact and redressability. Id. at 7-9. As to the injury requirement, the Court noted that many of the TAP members reside and work in the Aransas area and, for some, their livelihood depends in large part on the AWB cranes. (D.E. 270 at 7). Indeed, the tourism economy of the area relies on the annual migration of the Whooping Cranes to the nearby Refuge. This finding was reinforced by testimony at trial. For example, TAP member Albert Johnson is the proprietor of *The Crane House*, a small home that is rented to tourists, photographers, and naturalists that come specifically to observe the Whooping Cranes.¹⁵ (Johnson, Day 4, Tr 182-183). TAP member Ray Kirkwood works as the narrator on the *Wharf Cat*, a boat that tours the Aransas Refuge, allowing visitors to observe a healthy, active estuarial system, and the AWB Whooping Cranes in their winter home. (Kirkwod, Day 4, Tr 136, 141, 146-148). Aransas County Judge Burt Mills testified that the AWB flock has always been an important aspect of the tourist industry for Aransas County. (Mills, Day 4, Tr 108, 117).

In addition, the Court found that many of TAP’s members are active birders and devote substantial time and effort to observing Whooping Cranes and other birds in their natural habitat.

¹⁵See PX-106, Mission statement of *The Crane House Bed & Breakfast*.

(D.E. 270 at 7). At trial, Deborah Corpora, a Rockport birder, testified as to the pleasures of watching the Whooping Cranes at the Aransas Refuge. (Corpora, Day 3, Tr 154-170). The evidence was uncontested that TAP members had aesthetic, recreational, economic, professional, and other interests in photographing, studying, protecting and otherwise enjoying the AWB cranes in their natural environment. (D.E. 270 at 7-8).

The Supreme Court has recognized that “environmental plaintiffs adequately allege injury in fact when they aver that they use the affected area and are persons “for whom the aesthetic and recreational values of the area will be lessened by the challenged activity.” Friends of the Earth, Inc. v. Laidlaw Env'tl. Servs. (TOC), 528 U.S. 167, 183 (2000). Fewer AWB cranes would adversely affect the tourism, visual observation, and recreational enjoyment of TAP members. Thus, TAP successfully demonstrated that its members were “among the injured” for purposes of standing. Lujan, 504 U.S. at 562-63.

2. Redressability.

In denying TCEQ defendants’ and GBRA’s motion for partial summary judgment, the Court previously found that TAP had also established redressability. (D.E. 270 at 9-12). To establish redressability, it must be “likely, as opposed to merely speculative, that the injury will be redressed by a favorable decision.” Friends of the Earth, Inc., 528 U.S. at 181. The relevant question is simply, “whether a plaintiff personally would benefit in a tangible way from the court's intervention.” Steel Co. v. Citizens for a Better Environment, 523 U.S. 83, 103 n.5 (1998) (internal quotation marks omitted). “When . . . a plaintiff's asserted injury arises from the government's allegedly unlawful regulation (or lack of regulation) of someone else . . . causation and redressability ordinarily hinge on the response of the regulated (or regulable) third party to

the government action or inaction - and perhaps on the response of others as well.” Lujan, 504 U.S. at 562.

In their motion for partial summary judgment, and again at trial, the TCEQ defendants argued that they lacked the authority or the power to control the activities of permitted water right users and Domestic and Livestock (D&L) water right owners. (D.E. 214). GBRA argued that, even if the TCEQ defendants did have the authority to alter the issuance of new or existing water permits, such an action would not noticeably affect freshwater flows to the Aransas Refuge such that any ordered relief would be “pointless.” (D.E. 215). The Court rejected those arguments pretrial finding that, based on the summary judgment evidence alone, the TCEQ defendants have the authority over water permits and water diversions. (D.E. 270 at 11). At trial, witnesses for TAP established that the TCEQ defendants have the plenary authority to implement Texas laws and to fulfill federal law, and more particularly, the ESA,¹⁶ and that declaratory and injunctive relief would most certainly help the AWB flock.

With respect to declaratory judgments, the Supreme Court has stated, “the question . . . is whether the facts alleged, under all the circumstances, show that there is a substantial controversy between parties having adverse legal interests, or sufficient immediacy and reality to warrant the issuance of a declaratory judgment.” MedImmune, Inc. v. Genentech, Inc., 549 U.S. 118, 127 (2007). TAP seeks a declaration that the TCEQ defendants have violated ESA Section 9 in the past and are presently violating Section 9 by issuing water permits and authorizing diversions, as well as a declaration that water diversion regulations are preempted by federal law when they purport to allow activities that result in the taking of Whooping Cranes. (D.E. 1 at 32, ¶¶ A, B, C).

¹⁶ The TCEQ’s powers and authority are addressed in more detail in the Burford abstention discussion, *infra*.

Such a declaration would assist TAP in its overall goal of developing a plan to protect the AWB flock.¹⁷

TAP has requested injunctive relief. (D.E. 1 at 32-33, ¶¶ D, E). At trial, the Court heard testimony from TCEQ officials including Mark Vickery, a former TCEQ Executive Director, who testified that the TCEQ has the authority to issue or deny a permit, or to impose conditions on the permit. (Vickery, Day 4, Tr 205). Indeed, the TCEQ has the “continuing right of supervision of State water resources.” *Id.* Tr 204. The Court rejects the TCEQ defendants’ arguments that they are essentially powerless to regulate water resources in the manner TAP suggests. An injunction preventing new approvals of permits until there are “sufficient assurances” that these permits will not result in harm to the Whooping Cranes could effectively redress TAP’s concerns regarding freshwater inflows to the Refuge for the benefit of the AWB flock.

Finally, as to TAP’s request for development of an HCP and the issuance of an ITP under 16 U.S.C. § 1539(a)(2), this too would redress TAP’s injury. The Supreme Court has rejected overly “draconian interpretation[s] of the redressability requirement.” *Larson v. Valente*, 456 U.S. 228, 243 n. 15 (1982). A plaintiff “satisfies the redressability requirement when he shows that a favorable decision will relieve a discrete injury to himself. He need not show that a favorable decision will relieve his every injury.” *Id.* At trial, TAP’s experts offered several proposals to prevent future takings of Whooping Cranes. TAP has satisfied the standing requirement of redressability.

3. Causation.

¹⁷ At oral argument, TAP confirmed that a declaratory judgment as to violation of ESA Section 9 would significantly redress its injury. (July 28, 2010, Hearing at 2:29:08; Mr. Blackburn: “I think that a declaratory judgment from this Court that the Endangered Species Act had been violated would also be an incentive to find a solution. We are willing to work with the State to come up and craft a solution.”).

As to the third element of standing, causation, the Court found prior to trial a relationship between the TCEQ defendants' water management practices and the freshwater flows to the Aransas Refuge. (D.E. 270 at 13-17). However, as to the second aspect of causation in this case, namely, TAP's allegation that low freshwater flows caused the deaths of at least 23 Whooping Cranes in 2008-2009, the Court concluded that material issues of fact remained. Id. at 17.

The federal courts have found causation where there has been a direct relationship between the challenged government regulation and the resulting "take." For example, in Loggerhead Turtle v. County Council of Volusia County, plaintiffs sued Volusia County, alleging inter alia, that its refusal to ban beachfront artificial light sources (cars), adversely impacted the loggerhead turtle, resulting in a taking in violation of ESA Section 9. 148 F.3d at 1234-35. The Eleventh Circuit found the plaintiffs had standing, and had sufficiently alleged causation based upon the lack of regulation, "even though the actions or inactions of those third parties not before the court may be another cause of the harm." 148 F.3d at 1253 (internal citations and quotation marks omitted). Similarly, in Strahan v. Coxe, the district court found sufficient causation between harm to the endangered northern Right Whale and governmental regulation of commercial fishing vessels and whale-watching vessels in Massachusetts waters. The court explained:

Indisputably, the actions of third parties not before the court – commercial fishing and whale watch operations – are the immediate cause of the harm to endangered whales alleged here. **Defendants do not place gillnets and lobster gear in coastal waters, nor do they operate whale watch vessels. Nevertheless, the actions of these third parties are dependent on the actions of the Defendants.** Fishing vessels cannot, legally, place gillnets and lobster gear in Massachusetts waters without permission from the Defendants. And whale watch vessels cannot, legally, approach within 500 yards of Right whales in Massachusetts waters without permission from the Defendants. Thus, to the extent that he challenges the operations of licensed commercial fishing and whale watch vessels, Strahan

has shown a causal connection between the injury he has suffered (and will continue to suffer) and the actions of the Defendants in issuing such licenses.

Strahan v. Coxe, 939 F. Supp. 963, 978-79 (D. Mass. 1996) (emphasis added); see also Defenders of Wildlife v. Guterrez, 532 F.3d 913, 924 (D.C. Cir. 2008) (in suit against Coast Guard alleging violations of ESA Section 9 due to establishment and maintenance of shipping lanes in areas inhabited by right whales, court rejected argument that chain of causation was too attenuated); Seattle Audubon Soc'y v. Sutherland, 2007 WL 1300964 (W.D. Wash. May 1, 2007) (finding sufficient causation between state agency regulation over logging and taking of spotted owls, explaining, “[t]he alleged destruction of spotted owl habitat on private lands is fairly traceable to State Defendants’ actions because State Defendants enforce the rules governing such logging operations and the independent logging operators cannot conduct Class III applications on their private lands without the authorization of the Department.”).

As will be discussed in the Findings below, at trial TAP offered essentially uncontroverted evidence to establish: (1) the TCEQ defendants are responsible for water permitting and water diversions from the San Antonio and Guadalupe River systems, and the increased water diversions have left less water for the cranes; (2) reduced water flows lead to high bay/estuary salinities (in excess of 30 to 40 ppt in wide spread sampling); (3) high San Antonio bay/Guadalupe estuary salinities lead to a reduction in the availability of wolfberries, blue crabs, and fresh drinking water; (4) the reduced availability of the cranes’ primary food sources, coupled with the expenditure of more energy to fly farther to search for food and freshwater, leads to malnourishment and death; and (5) TCEQ defendant’s water practices caused the death of at least 23 whooping cranes in the 2008-2009 winter. That is, the mortality

of the Whooping Crane population is directly attributable to the lack of freshwater inflows to these crucial estuaries.

B. Burford abstention.

In both their pre- and post-trial briefings, defendants and intervenors have requested that the Court abstain from adjudicating this case pursuant to the Supreme Court's holding in Burford v. Sun Oil Co., 319 U.S. 315 (1943) ("Burford abstention").

In Burford, the Supreme Court affirmed a district court decision dismissing an action in which the Sun Oil Company challenged a Texas Railroad Commission order granting Burford a permit to drill certain oil wells. 319 U.S. at 316-17. The competing drilling interests plus the State's regulatory powers of oil and gas conservation all came into play. Id. at 318.

Recognizing the significant state regulatory framework, the Court concluded that federal court abstention was proper. The Court reasoned:

The state provides a unified method for the formation of policy and determination of cases by the Commission and by the state courts. The judicial review of the Commission's decisions in the state courts is expeditious and adequate. Conflicts in the interpretation of state law, dangerous to the success of state policies, are almost certain to result from the intervention of the lower federal courts. On the other hand, if the state procedure is followed from the Commission to the State Supreme Court, ultimate review of the federal questions is fully preserved here. Under such circumstances, a sound respect for the independence of state action requires the federal equity court to stay its hand.

Burford, 319 U.S. at 333-34.

The Fifth Circuit has explained that, "Burford abstention applies when a case involves a complex issue of unsettled state law that is better resolved through a state's regulatory scheme."

Moore v. State Farm Fire & Cas. Co., 556 F.3d 264, 272 (5th Cir. 2009) (citing Burford v. Sun Oil Co., 319 U.S. 315, 332 (1943)). As part of its Burford abstention analysis, a court must

consider five factors: (1) whether the cause of action arises under federal or state law; (2) whether the case requires inquiry into unsettled issues of state law or into local facts; (3) the importance of the state interest involved; (4) the state's need for a coherent policy in that area; and (5) the presence of a special state forum for judicial review. Moore v. State Farm Fire & Cas. Co., 556 F.3d 264, 272 (5th Cir. 2009) (citing Wilson v. Valley Elec. Membership Corp., 8 F.3d 311, 314 (5th Cir. 1993)).

Burford abstention represents “an extraordinarily and narrow exception to the duty of the District Court to adjudicate a controversy properly before it.” Quackenbush v. Allstate Ins. Co., 507 U.S. 706, 727-28 (1996); Wilson v. Valley Elec. Membership Corp., 8 F.3d 311, 313 (5th Cir. 1993) (explaining that abstention remains the exception, not the rule). The “federal courts’ obligation to adjudicate claims within their jurisdiction [is] virtually unflagging.” New Orleans Public Serv., Inc. v. Council of City of New Orleans, (“NOPSI”), 491 U.S. 350, 359 (1989).

The most important aspect of Burford is whether there exists a state process to which a federal court might abstain. That is, there must be “time and adequate state-court review” available. NOPSI, 491 U.S. at 360. Additionally, the NOPSI court underscored “[w]hile Burford is concerned with protecting complex state administrative processes from undue federal interference, it does not require abstention whenever there exists such a process, or even in all cases where there is ‘potential for conflict’ with state regulatory law or policy.” Id. at 362 (quoting Colorado River Water Conservation District v. United States, 424 U.S. 800, 815-16 (1976)).

In arguing for abstention, defendants and intervenors rely on the Fifth Circuit’s decision in Sierra Club v. City of San Antonio, 112 F.3d 789 (5th Cir. 1997), an ESA case involving

water withdrawals from the Edwards Aquifer that affected an endangered species, the fountain darter. Id. at 791. The district court issued an ESA injunction ordering the water officials to limit pumping from the Edwards Aquifer based on spring flows.¹⁸ Id. The injunction was to remain in effect until the defendants demonstrated a water management plan that would preserve the fountain darter, and defendants were further ordered to supply the court and a special master with monthly water usage information. Id. On appeal, the Fifth Circuit held that the lower court erred by issuing an injunction finding that the case was not likely to succeed on the merits due to Burford. The Fifth Circuit noted the need for “uniform regulation” in the state regime governing water withdrawals, and found that the legislation in place, the “Edwards Aquifer Act,” could “fairly be characterized as a comprehensive regulatory scheme. It represents a sweeping effort by the Texas Legislature to regulate the aquifer with due regard for all competing demands for the aquifer’s water.” Sierra Club, 112 F.3d 794.

1. Senate Bill 3.

The TCEQ defendants, GBRA, and SARA argue that abstention is warranted in this case because the State of Texas now has in place a comprehensive regulatory scheme, Senate Bill 3 (S.B.3), that regulates the State’s surface water flows. See Tex. Water Code § 11.1471, Environmental Flow Standards and Set-Asides (2007). The TCEQ and GBRA argue that S.B.3 addresses a number of environmental issues, including endangered species, and attempts to present a comprehensive state regulatory scheme such that federal abstention is mandated.

¹⁸ Unlike this case, the named defendants in that action were not State officials or actors, but were independent aquifer pumpers. The State entity that was created to impose pumping restrictions, the Edwards Aquifer Authority (EAA), allegedly refused to act, and the Sierra Club sued the aquifer pumpers directly.

TCEQ defendants and GBRA maintain that federal intervention would disrupt the S.B.3 process and undermine the State's efforts to manage its surface waters.

In 2001, the 77th Texas legislature passed Senate Bill 2, which directed the TCEQ, the Texas Water Development Board (TWDB), and the Texas Parks and Wildlife Department (TPWD), in cooperation with other agencies, "to ... jointly establish and continuously maintain an instream flow data collection and evaluation program." Texas Water Code (TWC) § 16.059. In addition, the agencies were directed to "... conduct studies and analyses to determine appropriate methodologies for determining flow conditions in the state rivers and streams necessary to support a sound ecological environment." Id.

In 2007, the Texas legislature passed S.B.3, establishing the Environmental Flows Allocation Process, also known as "E-flows," to address inflow water needs. See TWC § 11.1471, et seq. S.B.3 mandates that the TCEQ:

- (1) adopt appropriate environmental flow standards for each river basin and bay system in this state that are adequate to support a sound ecological environment, to the maximum extent reasonable considering other public interests and other relevant factors;
- (2) establish an amount of unappropriated water, if available, to be set aside to satisfy the environmental flow standards to the maximum extent reasonable when considering human water needs; and
- (3) establish procedures for implementing an adjustment of the conditions included in a permit or an amended water right ...

TWC § 11.1471(a). To achieve these objectives, S.B.3 directs the TCEQ to establish and implement a comprehensive plan for each of Texas' seven major river basins and bays to determine appropriate E-flows.

Pursuant to S.B.3, the TCEQ developed a scheme for collecting data and information to formulate E-flow recommendations. TWC § 11.02362 et seq. For each river basin and bay system, there is a stakeholder team and a science team to consider and formulate flow recommendations to the TCEQ, and there are two statewide groups that oversee the entire process.¹⁹ The statewide Environmental Flows Advisory Group (EFAG) is responsible for appointing members to the statewide Science Advisory Committee, as well as appointing members to each local stakeholder team.²⁰ TWC § 11.0236. EFAG is permitted to make comments on the recommendations of the local science teams for each basin. Id.

The Science Advisory Committee (SAC) is responsible for defining the geographical extent of each river basin and bay system for the “sole purpose of developing environmental flow regime recommendations.” TWC § 11.02361. The SAC provides overall direction and coordination, and ensures that consistent and acceptable scientific principles are utilized throughout the environmental flows allocation process in each region. The SAC has issued technical guidance documents for the local science teams to use in developing recommended

¹⁹ Texas’ seven major estuaries along the east coast are, from north to south: (1) Sabine-Neches Estuary; (2) Trinity-San Jacinto Estuary; (3) Lavaca-Colorado Estuary; (4) Guadalupe Estuary; (5) Mission-Aransas Estuary; (6) Nueces Estuary; and (7) Laguna Madre Estuary. See PX-63.

²⁰In October 2009, EFAG appointed the members of the Guadalupe-San Antonio BBASC. A list of members for the Guadalupe-San Antonio river basins is filed as Exhibit 5 to D.E. 57.

flow regimes,²¹ and has created a framework for review and evaluation of the science team recommendations.²²

Under S.B.3, each region has a Basin and Bay Area Stakeholder Committee (BBASC). TWX § 11.02362(c)(1). The BBASC stakeholder team for each region must have at least seventeen members, and these teams are required to reflect a fair and equitable balance of local groups with interests in the basin and bay system.²³ The stakeholder team considers the recommendations of the science team, but it also considers other factors, including the present and future water needs related to water supply planning for that local basin and bay system. The BBASC is charged with appointing members to the area's Basin and Bay Expert Science Team ("BBEST"). TWC § 11.02362(c)(3). BBEST members are required to be technical experts with special knowledge regarding the river basin and bay system or the development of environmental flow regimes. TWC § 11.02362(i), (m). Pursuant to S.B.3, the local BBEST science team calculates the amount of water that needs to remain instream to protect the health and vitality of the given estuary. The BBEST submits its recommendations to the stakeholder BBASC team, as well as to the TCEQ. The stakeholder team considers the BBEST's recommended

²¹ For example, in June 2009, the SAC issued *Methodologies for Establishing Freshwater Inflow Regimes for Texas Estuaries, Within the Context of the Senate Bill 3 Environmental Flow Process*. See (D.E. 57, Ex. 4).

²² A copy of the SAC's review criteria and framework is found at http://www.tceq.state.tx.us/assets/public/permitting/watersupply/water_rights/eflows/framework_sac_review_20100107pdf.

²³ Tex. Water Code § 11.02362(f). The statute requires that the interest groups include agricultural water uses (including irrigation, free-range livestock, and concentrated animal feeding operations); recreational water users (including coastal recreational anglers and businesses supporting water recreation); municipalities; soil and water conservation districts; industrial water users (including refining, electricity generation, chemical manufacturing, and paper and timber production); commercial fisherman; public interest groups; regional water planning groups; groundwater conservation districts; river authorities and other conservation and reclamation districts with jurisdiction over surface water; and environmental interests.

environmental flow regime, adds their associated policy considerations, and develops strategies to meet the flow recommendations. TWC § 11.02362(o). BBASC is not, however, required to follow or give any particular weight to the BBEST's technical recommendations. (Montagna, Day 3, Tr 232-33). The implementation strategies for protecting flows can include options such as efficiency incentives, the dedication of treated wastewater, and the purchase or donation of existing water rights. Id.

After the BBEST and BBASC each make a recommendation to the TCEQ, the TCEQ, through a public rule-making process, has one year to use those recommendations to legally adopt environmental flow standards for the river basin and inflows to the associated bay system.²⁴

Although S.B.3 does establish a comprehensive framework for the State of Texas to *determine* the amount of freshwater inflows that need to remain instream to protect the overall health of the State's river system, it makes no attempt to *ensure* that such recommended amounts remain. Indeed, to the contrary, S.B.3 specifically excludes from consideration the inflow needs of the bays and estuaries in times of water shortages. In addition, S.B.3 fails to address existing permits and water usage. In short, S.B.3 does not address, concern, protect, or assist the endangered whooping cranes, and therefore, provides no grounds for abstention.

S.B.3 sets forth the "Policy Regarding Waters of the State." TWC § 11.0235. It recognizes that the waters of the state are held in trust for the public, and that the right to use

²⁴ For the Guadalupe/San Antonio river basins, the BBEST submitted its recommendations on the amount of water necessary to ensure a sound ecological environment to the BBASC on March 1, 2011. The BBASC submitted its recommendations to the TCEQ and to EFAG on September 1, 2011. The deadline for the TCEQ to adopt environmental flow standards for the Guadalupe and San Antonio area was September 1, 2012. See http://www.texaswatermatters.org/Guadalupe_SanAntonio_Mission_Aransas.htm.

state water may be appropriated only as expressly authorized by law. Id. § 11.0235(a). It acknowledges that maintaining the biological soundness of the state's rivers, lakes, bays, and estuaries "is of great importance to the public's economic health and general well-being," and it encourages "voluntary water and land stewardship to benefit the water in the state,...". TWC § 11.0235(b). However, there is no steadfast commitment to the bays and estuaries:

The legislature has expressly required the [TCEQ] commission while balancing all other public interests to consider and, *to the extent practicable*, provide for the freshwater inflows and instream flows necessary to maintain the vitality of the state's streams, rivers, and bay and estuary systems in the commission's regular granting of permits for the use of state waters.²⁵

TWC § 11.0235(c) (emphasis added). Thus, consideration of the bays and estuaries is initially relegated "to the extent practicable" status in balancing water demands. But to add insult to injury, the legislature goes on to provide that, in times of water shortages and drought, the needs of the bays and estuaries are expressly exempt from consideration:

...As an essential part of the state's environmental flows policy, all permit conditions relating to freshwater inflows to affected bays and estuaries and instream flow needs must be subject to a temporary suspension if necessary for water to be applied to essential beneficial uses during emergencies.

²⁵Since 1985, the TCEQ has been required by statute to consider the impact to bays and estuaries and instream uses when a permit is requested: Texas Water Code § 11.147(b) provides:

In its consideration of an application for a permit to store, take, or divert water, the commission shall assess the effects, if any, of the issuance of the permit on the bays and estuaries of Texas. For permits issued within an area that is 200 river miles of the coast, to commence from the mouth of the river thence inland, the commission shall include in the permit any conditions considered necessary to maintain beneficial inflows to any affected bay and estuary system, to the extent practicable when considering all public interests and the studies mandated by Section 16.058 as evaluated under Section 11.1491.

Thus, the protection of this provision extends only to permits within "200 river miles of the coast." Id.

TWC § 11.0235(d). That is, in times of drought or other water emergencies, S.B.3 specifically authorizes the TCEQ to suspend the recommended freshwater inflows to bays and estuaries that the S.B.3 process had determined to be necessary to maintain the ecosystem's health.

Under S.B.3, "beneficial use" is defined as the "use of the amount of water which is economically necessary for a purpose authorized by this chapter, when reasonable intelligence and reasonable diligence are used in applying the water to that purpose and shall include conserved water." TWC § 11.001(4). S.B.3 specifically identifies numerous purposes for which water may be appropriated. TWC § 11.023(a). This list includes domestic and municipal uses; agricultural and industrial use, including development of power by means other than hydroelectric; mining and recovery of minerals; hydroelectric power; navigation; recreation and pleasure; public parks; and game preserves. *Id.* § 11.023(a) (1), (2). The water needs of whooping cranes and other endangered species are not addressed by S.B.3, and in times of drought, they are expressly disregarded.

Moreover, the Texas legislature has specifically *excluded* as a beneficial use the allowance of water instream to benefit a bay or estuary. In response to state court litigation in which applicants sought a permitted water right to leave water instream,²⁶ the Texas legislature passed § 11.0237(a) of the Texas Water Code, which provides:

²⁶See *TCEQ v. San Marcos River Foundation*, 267 S.W.3d 356, 360 (Tex. App. -- Corpus Christi 2008, pet. denied.). In that case, the San Marcos River Foundation applied for a permit with the TCEQ in July 2000, requesting an appropriation of approximately 1.3 million acre feet of water to remain instream to benefit the Guadalupe/San Antonio bay and estuary system. GBRA and SARA, two of the defendant/intervenors in the case *sub judice*, objected and in March 2003, the TCEQ denied the permit. The Foundation filed suit to challenge the TCEQ's denial of the permit, but while the lawsuit was pending, § 11.0237(a) was enacted, thus specifically prohibiting the issuance of a permit to leave water instream to benefit the bays/estuaries, and the Foundation's action was dismissed as moot.

The commission may not issue a new permit for instream flows dedicated to environmental needs or bay and estuary inflows. The commission may approve an application to amend an existing permit or certificate of adjudication to change the use to or add a use for instream flows dedicated to environmental needs or bay and estuary inflows.

TWC § 11.0237(a). Thus, Texas law prohibits the TCEQ from issuing a water permit for the purpose of allowing water to remain instream to maintain the bay or estuary inflows, or to otherwise address environmental needs.

Finally, S.B.3 does not assist the whooping cranes because it applies only to applications for *new* water permits; it does not attempt to modify or amend water rights with priority dates earlier than September 1, 2007. Indeed, S.B.3 expressly prevents use of the E-flow process to regulate water users unless they are seeking *new* permits or *new* increases under existing permits:

(1) water appropriated under a permit for a *new* appropriation of water the application for which is pending with the Texas Commission on Environmental Quality on the effective date of this Act or is filed with the commission on or after that date; or

(2) the increase in the amount of water authorized to be stored, taken, or diverted under *an amendment to the existing water right* that increases the amount of water to be stored, taken or diverted and the application for which is pending with the Texas Commission on Environmental Quality on the effective date of this Act or is filed with the commission on or after that date.

Section 1.27 of Acts 2007, 80th Leg., ch 1430 2007 Tex. Gen. Laws 5846 (not codified in the Water Code) (emphasis added). Thus, S.B.3 and its quasi-considerations of maintaining necessary inflows has no impact on existing permits with a priority date before September 1,

2007. In addition, until the staggered S.B.3 process is actually completed, the TCEQ can continue to issue new water permits without regards to inflows.²⁷

S.B.3 establishes an administrative scheme to determine freshwater inflows to the state's bays and estuaries. It does not provide for enforcement of those recommendations, nor provide for penalties if the recommended inflows are not maintained. In addition, S.B.3 set certain deadlines for flow determinations to be made and adopted, but to date, no region has successfully completed the E-flow process. The TCEQ defendants, as well as GBRA and SARA, argue that S.B.3 provides an elaborate regulatory scheme for environmental flows that will address the concerns of the Whooping Crane, that federal intervention would disrupt the E-flow process, and therefore, that abstention is mandated under Burford. The Court disagrees. The mere existence of a state-created administrative body does not override the jurisdictional power of a federal court. The E-flow scheme and process may hopefully provide important and scientifically sound information to water officials and policy makers concerning each basin and bay, and eventually, promote actions to secure the recommended inflows and keep the rivers "wet." However, to suggest that S.B.3 can protect the whooping cranes, when by its own admission, it specifically excludes the cranes' habitat in times of water emergencies, is to argue that state law preempts federal law. This topsy-turvy view of federalism and the Constitution's Supremacy Clause has no basis in the existing constitutional scheme. The Court has jurisdiction under the ESA.

²⁷ The TCEQ developed a website dedicated to the E-flows process and mandates of S.B.3. The website offers updates on specific basin/estuary BBEST and BBASC recommendations, as well as SAC guidance and discussion papers. There is no indication that any river basin has yet completed the process, which includes TCEQ's adoption of a recommendation and corresponding rule formulation for each river basin. See http://www.tceq.state.tx.us/permitting/water_supply/water_rights/eflows/resources.html

2. Texas surface waters.

Moreover, the Court finds that, not only does the ESA mandate federal court intervention in this case, but Texas' own water laws and policies warrant judicial oversight in this instance because, contrary to the position of defendants and intervenors, Texas law specifically authorizes the TCEQ to manage the State's surface waters in a manner consistent with conservation and in compliance with federal law, and the TCEQ defendants have failed to do so.

The surface waters in the State of Texas are owned by the state itself:

(a) The water of the ordinary flow, underflow, and tides of every flowing river, natural stream, and lake, and of every bay or arm of the Gulf of Mexico, and the storm water, floodwater and rainwater of every river, natural stream, canyon, ravine, depression, and watershed in the state is the property of the state.

(b) Water imported from any source outside the boundaries of the state for use in the state and which is transported through the beds and banks of any navigable stream within the state or by utilizing any facilities owned by the state is property of the state.

TWC § 11.021.

"The waters of the state are held in trust for the public." TWC § 11.0235(a). No person may divert, store or impound state-owned water without authorization, by permit, certificate of adjudication, or one of the statutory exemptions.²⁸ TWC §§ 11.081, 11.121.

²⁸ Since the Irrigation Act of 1889, the allocation of surface water in Texas has been subject to the "prior appropriation" doctrine. In re Adjudication of the Water Rights of the Upper Guadalupe Segment of the Guadalupe River Basin, 642 S.W.2d 438, 440 (Tex. 1982). As between lawful appropriators, first in time equals first in right. See Tex. Water Code § 11.027. The holder of a more senior water right is entitled to draw all of the water to which he or she is entitled before the holder of a more junior right is entitled to any. In 1967, the Texas Water Rights Adjudication Act required all appropriators of surface waters to prove their usage in court. Guadalupe River, 642 S.W.2d at 439, 442. This judicial process clarified who held a right to withdraw water, eliminated the dual riparian and prior appropriation regime, and recorded the priority of the rights to divert state water. Each person who went through the judicial process received a "certificate of adjudication." The certification process codified all rights that predated the existing permit system, and extinguished the claims of those who could not prove their use. Tex. Water Code, ch. 11, subchapter G. Thus, the most senior non-exempt rights recognized by Texas are generally certificates of adjudication.

Some water rights, such as Domestic and Livestock (D&L), are exempt from the permitting or adjudication process.²⁹ TWC § 11.142. A D&L user may divert water from a stream or may impound up to 200 acre-feet³⁰ of water at a time in an impoundment or reservoir.³¹ Id. D&L water rights are not recorded, nor are they monitored by any water enforcement office. (Soward, Day 4, Tr 253).

The TCEQ is the state agency with “general jurisdiction” over both “water and water rights” in Texas.³² TWC § 5.013(a). Via statute, the Texas legislature has conferred upon the TCEQ the plenary authority to implement Texas laws and to fulfill federal law. TWC § 5.015. The Texas Supreme Court has held that, when the legislature confers agency power, it impliedly intends that the agency have whatever powers are reasonably necessary to fulfill its express functions or duties. Texas Natural Res. Conservation Comm’n v. Lakeshore Util. Co., 164 S.W.3d 368, 377-78 (Tex. 2005).³³

²⁹ Since the mid-1900's, Texas recognized “riparian rights,” under which owners and occupiers of land along rivers could make “reasonable use” of the water flowing by. Guadalupe River, 642 S.W.2d at 439. Following the 1967 adjudication of water rights process, many riparian right owners received certificates of adjudication. Now, owners of river-front property are included under the D&L exemption of TWC § 11.142. Thus, technically, there are no longer any “riparian right” owners, as they are included within the D&L exemption. However, the term “riparian right” continues to exist.

³⁰ An acre-foot of water is 325,851 gallons.

³¹ The D&L exemption provides, in relevant part: “Without obtaining a permit, a person may construct on the person’s own property a dam or reservoir with normal storage of not more than 200 acre-feet of water for domestic and livestock purposes. A person who temporarily stores more than 200 acre-feet of water in a dam or reservoir ... is not required to obtain a permit for the dam or reservoir if the person can demonstrate that the person has not stored in the dam or reservoir more than 200 acre-feet of water on average in any 12-month period.” TWC § 11.142.

³² The jurisdiction and powers of the TCEQ are found in the Texas Water Code, Title 2, entitled “Water Administration,” and in particular, Chapters 5 and 11. Chapter 5 creates the agency and defines its duties, powers, and areas of jurisdiction. Chapter 11 details water rights.

³³ The Texas Supreme Court also holds that “[s]tatutes are given a construction consistent with constitutional requirements, when possible, because the legislature is presumed to have intended compliance with state and federal constitutions.” Brady v. Fourteenth Court of Appeals, 795 S.W.2d 712, 715 (Tex. 1990); Tex.

Texas' legal framework for resolving water conflicts is based on permit priority. Section 11.027 of the Texas Water Code provides simply: "As between appropriators, the first in time is the first in right." TWC § 11.027.

Former and current TCEQ employees and officials testified at trial about their water management responsibilities and powers. Al Segovia is a named TCEQ defendant in this action, and at the time this suit was filed, he was employed as both the South Texas Watermaster and the Concho River Watermaster. (Segovia, Day 4, Tr 52). In certain river basins, the TCEQ has implemented a watermaster program to protect priority water uses. See TWC § 11.326. The purpose of the watermaster program is to manage, monitor, archive, and enforce surface water rights based on priority. Id. Tr 53-54.

Under the watermaster program, water right owners, junior and senior, must contact the watermaster before diverting water. Id. Tr 55. Depending on the river conditions at the time, the watermaster can grant permission, delay permission, or if necessary due to drought, deny permission to take water. Id. The watermaster keeps records and monitors water use of permitted water right owners through various reporting mechanisms and forms.³⁴ Id. Tr 57.

Water rights are relative to one another; the oldest water right is the most senior, and all other rights are junior to it. (Segovia, Day 4, Tr 60). If a junior water right owner seeks to

Gov't Code § 311.021.

³⁴ The watermaster office has employees known as watermaster specialists or deputies whose jobs are similar to game wardens or "water police." (Segovia, Day 4, Tr 68). Their offices are located throughout South Central Texas, and each one is responsible for approximately 10 counties. Id. Their job is to drive up and down the rivers and creeks and confirm that the water being taken by owners is authorized, and to report any instances in which it is not. Id. In monitoring water usage, watermaster deputies rely on the United States Geological Survey (USGS) gauges that are scattered throughout Texas, primarily on the main river systems. Id.

withdraw water during a drought, the watermaster must organize a meeting to discuss the situation and determine if other owners can reduce their use. Id. Tr 61. In reality, the watermaster program is “no more than a balancing act,” and it presents “a constant battle.” Id. The watermaster has the authority to tell a water owner: “You can’t take this water at this time.” Id. Indeed, water users are “all under the same drought.” Id.

When water diversions must be reduced, junior right holders are restricted first. (Segovia, Day 4, Tr 62). However, because Texas often suffers from drought conditions, even senior holders must be restricted at times, and the watermaster has the authority to order restrictions or limitations on the amount of water diverted. Id. Tr 70-71. The first priority owners are those with D&L/riparian rights, and it is the watermaster’s job to ensure that downstream riparian right owners get their water. Id. Tr 71. One method to address water demand is to stagger use along the river. Id. at 62. The primary objective is to “keep the river wet.” Id.

D&L/riparian right owners are authorized to withdraw 200 acre-feet of water annually. (Segovia, Day 4, Tr 77-79). And see TWC § 11.142. However, the watermaster does not monitor the D&L/riparian owner’s use. Id. A watermaster might visually check stored water to see if it remains at the same capacity, but there is no way of determining whether the riparian owner emptied and refilled the reservoir, thus using more than the allowed 200 acre-feet. Id. Tr 78-79.

Recently retired TCEQ Executive Director Mark Vickery, a named defendant in his official capacity, testified for TAP about the TCEQ’s administrative and monitoring responsibilities concerning permitted water withdrawals, as well as enforcement authority.

(Vickery, Day 4, Tr 195). In his role as Executive Director, he had policy discretion, as well as implementation authority. Id. Tr 198.

The TCEQ has enforcement authority over certificates of adjudication and water permits, and it has the authority to issue or deny a permit with conditions. (Vickery, Day 4, Tr 205). The TCEQ has the authority to contact industries about their water use and to encourage conservation efforts, such as industrial recycling.³⁵ Id. Tr 210-211. Some permits require return flows, but it is not “routine, and most older permits do not include a return flow requirement.” Id. Tr 212.

The Oath of Office for TCEQ Commissioners requires them to comply with federal law.³⁶ (Vickery, Day 4, Tr 212, 215). Since 1985, the water permit process now requires the TCEQ to consider the impact of water diversions on bays and estuaries. Id. Tr 218. And see TWC § 11.147(b). In addition, effective September 1, 2011, the legislature enacted section 11.053(c) of the Texas Water Code, entitled **EMERGENCY ORDER CONCERNING WATER RIGHTS**, which provides, in part:

(a) During a period of drought or other emergency shortage of water, as defined by commission rule, the executive director by order may, in accordance with the priority of rights established by Section 11.027:

(1) temporarily suspend the right of any person who holds a water right to use the water; and

(2) temporarily adjust the diversions of water by water rights holders.

(b) The executive director in ordering a suspension or adjustment under this section shall ensure that an action taken:

³⁵For example, “direct reuse” is a conservation operation by which diverted water sent to a waste plant can be taken and used, returned to the stream/river, and then retaken downstream multiple times. Id. Tr 211.

³⁶See PX-172, copy of TCEQ Commissioner’s Oath of Office.

- (1) maximizes the beneficial use of water;
- (2) minimizes the impact on water rights holders;
- (3) prevents the waste of water;
- (4) takes into consideration the efforts of the affected water rights holders to develop and implement the water conservation plans and drought contingency plans required by this chapter;
- (5) does not require the release of water that, at the time the order is issued, is lawfully stored in a reservoir under water rights associated with that reservoir.

TWC § 11.053.

Mr. Vickery agreed that, pursuant to the § 11.053 emergency rule, the TCEQ now expressly has the authority to suspend or adjust water diversions in times of drought. Id. Tr 217. The TCEQ is charged with adopting rules to implement this section. Id.

The TCEQ has the discretion to make exceptions in both enforcement and in the implementation of terms and conditions of water rights. (Vickery, Day 4, Tr 224). For example, in 2008-2009, the TCEQ accommodated a request from the City of Kerrville to withdraw water to ensure that the public's health was protected. Id. The City of Kerrville was a junior water right. Id.

Mr. Larry Soward is a retired public servant with first-hand knowledge of not only the TCEQ, but its predecessor agencies, as well as state departments in land and agriculture.³⁷ (Soward, Day 4, Tr 235). His testimony established that the TCEQ has authority "across the board," in times of drought, and it can "... issue an emergency order to basically do anything that is necessary or appropriate to carry out their duties and responsibilities ..., in an emergency

³⁷ Mr. Soward's résumé is PX-261.

situation.” (Soward, Day 4, Tr 266). In Mr. Soward’s opinion, the TCEQ could use its emergency powers to protect the bays, estuaries, and whooping cranes. Id. S.B.3 does not provide protection to the cranes. Id. To the contrary, S.B.3 authorizes the TCEQ to suspend the recommended inflow provisions during times when the flow is not sufficient to meet the needs of water right holders. Id. S.B.3 expressly allows for bays and estuaries to be left unprotected in times of “emergencies,” that is, drought, the very time when the cranes need those inflows to be maintained. Id. Tr 268.

There are a number of methods available to the TCEQ to evaluate and address the competing demands for water. (Soward, Day 4, Tr 274-275). Under its emergency powers, the TCEQ can modify the usufructory rights of permit holders. Id. Tr 270. With the September 1, 2011 enactment of TWC § 11.053, the TCEQ now has the express authority to suspend or adjust water diversions in times of drought. Id. Thus, the TCEQ is no longer constrained by “first in time, first in right.” Id. Tr 271. The threatening of an endangered species could constitute an “emergency” or fall under the “public welfare” provision of § 11.053. Id. Tr 271-272.

Finally, Mr. Vickery noted that there is no prohibition to prevent the TCEQ from requiring an inventory of D&L users. Id. The TCEQ could initiate surveys to determine how currently permitted water is being used and initiate cancellation of unused water rights. Id. In addition, although the TCEQ does not require used water to be returned to the stream, it is required by statute, and the TCEQ could enforce water return. Id. Tr 275.

TAP’s witnesses established that the TCEQ has the authority to modify or amend existing water rights, delay or deny issuance of new permits, access and evaluate D&L usage, and take

any other action necessary in times of emergencies, including drought, to ensure that the necessary freshwater inflows reach the Aransas Refuge and the AWB cranes. Despite this authority, the TCEQ defendants did not exercise it in 2008-2009, and the permitted water diversions, along with the drought, effectively choked the San Antonio bay/Guadalupe estuary, creating hyper-saline conditions and adversely affecting the health of the AWB cranes.

In rebuttal to TAP's witnesses on TCEQ authority, the TCEQ defendants offered Mr. Todd Chenoweth, TCEQ special counsel for the Office of Water.³⁸ (Chenoweth, Day 5, Tr 147-148). Mr. Chenoweth reiterated TAP witnesses' testimony concerning the water permit process and provided additional detail in some areas. He did not contradict or dispute TAP's allegations that the TCEQ has authority to manage permitted water rights or address D&L usage. In fact, Mr. Chenoweth affirmed TCEQ's broad authority to manage water resources, and speculated as to additional actions the TCEQ could take under its broad powers. As previously noted, the TCEQ's duty to consider the water needs of the bays and estuaries applies only to those water permits/applications to divert or store water within 200 river miles of the coast. See TWC § 11.147(b). There are no provisions in S.B.3's E-flow process to extend the range of consideration. (Chenoweth, Day 5, Tr 163-164). Thus, even with S.B.3, the TCEQ need not consider the impact of freshwater diversions as to any permit application to store or divert water that is outside the 200 river miles from the coast. Many of the lakes and reservoirs that supply the San Antonio bay/Guadalupe estuary are outside of this 200 river miles limit.³⁹ In fact, the

³⁸ Mr. Chenoweth's résumé is DX-297.

³⁹ Texas has 188 major water-supply reservoirs. These reservoirs vary in size from 5,200 acre-feet conservation storage capacity for the Upper Nueces Lake to 4,472,900 acre-feet for the Toledo Bend reservoir. The lakes and reservoirs associated with the San Antonio bay/Guadalupe estuary are: Victor Braunig Lake; Olmos

San Antonio River is 240 river miles long and the Guadalupe River 250 miles long. For example, with permit applications, the TCEQ could authorize less water than the amount requested. (Chenoweth, Day 5, Tr 182). The TCEQ could impose “special restrictions,” prohibiting diversions if the instream water flow rate fell below a certain cubic feet per second (cfs). Id. He acknowledged that the TCEQ’s Water Availability Model (WAM) does not take into account exempt D&L users.⁴⁰ Id. Mr. Chenoweth proposed other means by which the TCEQ and a water right holder could work together to conserve water use to benefit the environment.⁴¹ That is, Mr. Chenoweth’s testimony confirmed the testimony of TAP’s witnesses, that the TCEQ has the authority and power to modify, amend, adjust, or in any manner affect priority water rights if it determines it is necessary to do so.

The last witness to testify about TCEQ authority was Margaret Hoffman, an attorney who worked at the TCEQ from 1993 to 2004, and served as the TCEQ executive director for some

Reservoir; Medina Lake; Lake McQueeney; Lake Gonzales; Lake Dunlap; Coletto Creek Reservoir, Canyon Lake; and Calaveras Lake.

⁴⁰ In Mr. Chenoweth’s opinion, the D&L data is not important because, due to its superiority, even if the TCEQ knew the D&L water usage amount, it would simply add that number into the WAM model, and then subtract it right back out. (Chenoweth, Day 5, Tr 184). That is, the “naturalized flow process” and WAM already takes into account the D&L usage because the historical data collected was subject to the D&L withdrawals. Id. Tr 185. However, this reasoning incorrectly assumes that the TCEQ has no authority over D&L rights. Because the TCEQ could require reductions or modifications in D&L use, it would be essential to know the amount of water that is involved.

⁴¹ For example, where an entity anticipates that it may have difficulty with TCEQ compliance and thus subject to associated fines and penalties, the entity can participate in a Supplemental Environmental Project (SEP). (Chenoweth, Day 5, 205). Instead of paying fines and penalties, the entity can direct a portion of the money to a fund for environmental projects, rather than to the TCEQ. Id. There is also a Texas Water Trust, established by the Texas Water Development Board, and it funds water projects through a variety of mechanisms, such as EPA loans and bonds. Id. Tr 206. The Water Trust has funded water treatment plants, drinking water plants, and lake water plants. Id. It can partially fund construction of reservoirs. Id. It is also involved in science-based studies to improve estimates on predicting water availability. Id.

portion of her time there.⁴² (Hoffman, Day 8, Tr 218-251). Ms. Hoffman testified that TCEQ is constrained by what she called “permanent water rights.”⁴³ Id. Tr 232. She explained that a permanent water right is a vested property right, as opposed to term permits, temporary permits, and seasonal permits, that are subject to being cancelled or revisited. Id. Tr 232. In times of water shortage, those “temporary” rights are modified first. Id.

Ms. Hoffman testified that the Texas Water Code affords highest priority for municipal and domestic use,⁴⁴ but that in times of shortage, the TCEQ’s primary responsibility is to protect senior water rights. Id. Tr 233. Ms. Hoffman was unaware of the September 1, 2011 Emergency Rule, TWC § 11.053, that expressly authorizes the TCEQ to temporarily suspend or adjust the right of any person who holds a water right. Id. Tr 243-44. She agreed that the TCEQ has the authority to cancel unused water rights, and was unaware of any prohibition against requiring D&L users to report their usage. Id. Tr 245.

Ms. Hoffman confirmed that the TCEQ could cancel unused water rights, and require D&L users to report their water usage. Because she was unaware of TWC § 11.053, the

⁴² Ms. Hoffman’s CV is DX-299.

⁴³ The Texas Water Code, § 11.040 provides that: “A permanent water right is an easement and passes with title to the land.” TWC § 11.040(a). A “water right” is defined as “a right acquired under the laws of this state to impound, divert, or use state water.” TWC § 11.002(5).

⁴⁴ Section 11.024, Texas Water Code, “Appropriation: Preferences” provides in part:

In order to conserve and properly utilize state water, the public welfare requires not only recognition of beneficial uses but also a constructive public policy regarding the preferences between these uses, and it is therefore declared to be the public policy of this state that in appropriating state water preference shall be given in the following uses and order named: (1) domestic and municipal uses, ... (2) agricultural uses and industrial uses, ... (3) mining and recovery of minerals; (4) hydroelectric power; (5) navigation; (6) recreation and pleasure; and other beneficial uses.

Emergency Order Concerning Water Rights, effective September 1, 2011, that is, three months prior to trial, she was unable to offer any opinion or testimony as to its scope or application.

The Court concludes that TAP has established by a preponderance of the evidence, that the TCEQ defendants have the authority, power, and responsibility to manage water diversions, and the ESA requires that such management take into account the health and survival of the AWB whooping cranes. The Court finds further that TCEQ has refused to issue a permit to permit freshwater inflow for the protection of the AWB habitat and that S.B.3 either by definition or application will not protect the winter habitat of the AWB.

In summary, S.B.3 does not constitute an elaborate regulatory scheme for environmental flows that will address the concerns of the Whooping Cranes because: (i) it is riddled with carve-outs and exceptions that relegate the ecological needs of the Whooping Cranes' to a secondary status; (ii) it has no enforcement mechanism, that policy framework, no matter how elaborate, has no "teeth;" (iii) bays and estuaries, in particular, are relegated to a lesser status as, by statute, the TCEQ may not issue a new permit dedicated to the environmental needs of a bay or estuary; and (iv) S.B.3 and its E-flows scheme only applies to the issuing of new water rights or the expansion of an existing water right.

IV. FINDINGS ON CAUSATION.

A. Court's findings as to witness expertise and credibility.

At trial, TAP presented seventeen (17) witnesses, ten (10) of whom were experts; GBRA eight (8); SARA one (1); and TCEQ two (2). As will be discussed in more detail later, TAP's experts were world renowned in their respective fields. Several of TAP's witnesses hold

endowed chairs at prestigious universities, some are MacArthur Fellows, all have published numerous scientific papers in respected journals. Indeed, one witness, Dr. Ronald Sass, is a shared recipient of the 2007 Nobel Peace Prize for his environmental work. TAP's crane experts, Dr. Chavez-Ramirez, Dr. Archibald, and Mr. Stehn, have years of study in the field and have devoted their time and energies to the survival of the AWB species. All of TAP's experts were accepted as such and the Court finds their testimonies compelling and credible.

In contrast, the Court found an alarming trend in the experts that GBRA offered, most of whom had limited experience and insignificant knowledge of whooping cranes in particular. Indeed, in most instances it was established that GBRA selected the data for which its experts were to make a determination without regard to the peer reviewed published scientific data available. In particular, intervenors GBRA and SARA wholly financed what is called the SAGES report partially designed by Dr. Stephen E. Davis, who testified as a modeling expert, and Dr. R. Douglas Slack. This report did not include the Chavez-Ramirez or Stehn research. In fact, it used a report by Dr. Slack's graduate student Danielle Greer whose conclusions to the preferred food of whooping cranes was based on 90 plus hours of video of three crane areas. The Court watched all the videos and finds that they were either too blurred to see anything or non-demonstrative of any habit, feeding or otherwise. When subjected to peer review Greer's conclusions were soundly criticized.

Dr. Slack testified that the whooping cranes had well developed supraorbital salt glands which rid the body of excess salt, making them capable of living in a salt water marsh with no freshwater. When pressed by the Court, he admitted that he had made up that entire statement.

Samuel Vaughn, an engineer who was employed by HDR Engineering in Austin, who has as principal clients GBRA and SARA, was offered as some type of an expert on crane mortality based on faulty information supplied solely by GBRA. GBRA witness, Dr. Miller, admittedly without any evidence to support the testimony stated that decreased blue crab population may be related to commercial fishing. Dr. Porter, GBRA's "niche mapper," used mapping based on the diet of the Whooping Crane supplied solely by the SAGES report as found by Greer. Again, this was all that was supplied to him as a "niche mapper" to the exclusion of all other published articles on Whooping Crane diet. Dr. Conroy was offered to challenge the Stehn mortality rates but was completely lacking in any expertise on whooping cranes or their habitat. His testimony relied solely on a prior review of the literature selected and provided by GBRA.

Dr. Stroud, a veterinary pathologist, was offered to explain the Whooping Crane necropsy findings of another pathologist. His opinion was that the carcass that showed an infection was not based on the original pathologist description but based on the original pathologist description that green fluid was observed in a joint. To him the color green meant gangrene. This conclusion had no scientific merit but he kept insisting that when he saw green he thought of gangrene.

In conclusion, these witnesses, offered by GBRA, were not credible and not reliable. A more in depth discussion follows herein.

B. TCEQ's water diversions reduce freshwater inflows to the Refuge.

TAP argues that lower freshwater inflows to the Refuge from the San Antonio and Guadalupe river systems result in higher bay/estuary salinities, and that the water practices of the TCEQ defendants cause those lower freshwater inflows to the Refuge. For 2008-2009, TAP

maintains that those water practices caused the death of at least 23 Whooping Cranes. The fact that those diversions were “lawful water diversions under preexisting permits” is irrelevant in the context of this case because, as previously discussed, the ESA preempts state law to the extent it authorizes activities that cause a prohibited take of a listed species. 16 U.S.C. § 1539(a)(1)(B).

1. Trungale established permitted water diversions lower inflows to Refuge.

TAP introduced Joe Trungale, a licensed water resources engineer who currently is employed as a private consultant in the Austin area,⁴⁵ to demonstrate that TCEQ’s regulation of water causes reduced freshwater inflow to the Refuge, (Trungale, Day 3, Tr 252). Between 1999 and 2004, Mr. Trungale worked as a river studies hydrologist with the Texas Parks and Wildlife Department. Id. Tr 253.

Mr. Trungale employed simulation modeling of the San Antonio bay/Guadalupe estuary to predict salinity gradients that would occur in response to different freshwater inflow regimes. (Trungale, Day 3, Tr 254). The simulation modeling relied upon state and federal data sources, and employed TxBlend, a modeling system developed by the Texas Water Development Board (“TWDB”),⁴⁶ and used also by the TCEQ BBEST teams in the major estuary systems along the Texas coast in response to S.B.3. Id. Tr 254-255. Mr. Trungale has employed the TxBlend model to evaluate salinity in the past and as a member of BBEST teams for Galveston Bay, Matagorda Bay, and the Colorado and Lavaca River basins. Id. Tr 256-258.

The TxBlend model uses the instream flow data that has been measured by the USGS gauges over time, collected at the three most downstream gauges. (Trungale, Day 3, Tr 258).

⁴⁵ Mr. Trungale’s résumé is PX-262.

⁴⁶ The TWDB staff have both calibrated and validated the TxBlend model for use in the San Antonio Bay system. (Trungale, Day 3, Tr 282); PX-85, PX-86.

Id. These downstream gauges are used because they already reflect the upstream water diversions. Id. Tr 258. The model includes actual daily data inflow numbers collected from 1988 through 2009. Id. Tr 261. The gauges are positioned to get the best reflection as to what amount of water is making it from upstream to the mouth of the bay. Id. Tr 262. Thus, Trungale relied on ***actual water diversion data*** as reported to the South Texas Watermaster and TCEQ See DX-300 (list of all Guadalupe River Basin water right owners, permitted and adjudicated); DX-301(list of all San Antonio River Basin water rights); DX-302 and DX-303 (over 1,000 pages of TCEQ historical data); DX-304 (TCEQ historical use data); and PX-83 (map of water rights in the Guadalupe and San Antonio river basins).

Using these sources of information, Mr. Trungale employed the TxBlend model to generate three different scenarios of freshwater inflows to the San Antonio bay/Guadalupe estuary.⁴⁷ TAP's exhibits PX-92, PX-93, and PX-94, are maps constructed for the time period of May 2008 through April 2009, using the historical data provided. (Trungale, Day 4, Tr 7). All three exhibits show the salinity patterns in the AWB critical habitat. Id. PX-93 shows the ***actual*** salinities in the critical habitat for May 2008 - April 2009. Id. PX-92 shows what the salinities would have been if every reported diversion was added back into the stream. Id. Tr 8. That is, what the salinities would have been if there were no permitted diversions anywhere in the basin and all the river water flowed into the San Antonio bay/Guadalupe estuary. Id. Tr 9. The third scenario modeled the full use of certain existing permits: it took actual gauged flows and then assumed that six actual lower basin permits (all of which are GBRA's) diverted water

⁴⁷ Mr. Trungale did not model a "worst case" scenario employing the full use of all existing issued permits throughout the basin, nor did he model the impact of exempt D&L diversions. He did not model the impact of pending permit applications.

to the maximum amount permitted. Id.; PX-94. Under the “full use of permits” scenario, there are dramatic changes with resulting salinity greater than 25 ppt. Id. Tr 10. The third scenario reflected a realistic, but very conservative, picture of increased water use in the near future. Id.

Using TWBD inflow data for the full period of record, 1987-2009, TAP exhibit PX-90 was created; it provides a visual representation of the averaged over-time salinity levels across the San Antonio bay/Guadalupe estuary, which of course, includes the Refuge. (Trungale, Day 4, Tr 10). PX-90 demonstrates that for 2008-2009, a significant area of the bay had salinities greater than 25 parts ppt.⁴⁸ Id. Tr 12. Coincidentally, the winters of low freshwater inflows and high bay salinities correspond with the other “bad” winter years for cranes: the three winters of 1988-1989, 1989-1990 and 1990-1991 were all years of high winter Whooping Crane mortality (4.3%, 3.4% and 7.8% respectively). See PX-74. That is, as was later confirmed by TAP experts Sass and Ensor, higher salinity years correspond with higher crane mortality. Id.

Low freshwater inflows result in markedly higher salinities in the bays; however, even high salinities in the bay may be rapidly lowered by a month of relatively high freshwater inflows (e.g., October 2009-November 2009). (Trungale, Day 4, Tr 14); PX-96. For example, in the fall of 2009, at the start of the 2009-2010 Whooping Crane winter season, the bays had lower salinities due to increased inflows. Id. That is, relatively small amounts of freshwater inflows can make a significant difference to the bay salinities, and to the duration, frequency, and severity of high salinity conditions. Id. at 14-15.

Because even small inflows of freshwater can markedly decrease dangerous bay/estuary salinity levels, it would be useful to monitor bay salinities. (Trungale, Day 4, Tr 15). Then, if

⁴⁸The black line on the graph is actual inflows, and salinity is represented by color variations, with red indicating higher salinities and green indicating lower salinities. Id. Tr 10-11.

salinities reached an agreed upon “warning level,” responsive actions would be triggered, such as reducing water diversions until the salinities lowered. Id. For example, in Matagorda Bay, a salinity trigger level, known as a “Cumulative Salinity Depletion” (CSD), is incorporated as a condition in one TCEQ issued water permit. Id. Tr 16; See PX-12 at 7-11 (TCEQ permit granted on April 29, 2011, issued to Lower Colorado River Authority that defines beneficial flow criteria and if the CSD exceeds a certain amount, then certain actions are to be taken).

Defendants and intervenors argue that Mr. Trungale’s models “distort the impact of water diversions in 2008-2009,” because the data may have characterized as “diverted” water than had been impounded years prior. (D.E. 320 at 18). However, Mr. Trungale testified that, given the limitations on available data, his models were “conservative” and, in his opinion, accurate. (Trungale, Day 4, Tr 48-49) (“it seems very much in the range of what I would expect to see.”). Moreover, no defense witness challenged this aspect of Mr. Trungale’s methodology. Indeed, GBRA witness Dr. George Ward admitted that Mr. Trungale “ran the model correctly.” (Ward, Day 7, Tr 163). The evidence established that TCEQ’s authorized diversions impact freshwater inflows and in turn, the salinities of the San Antonio bay/Guadalupe estuary.

2. Trungale’s findings anticipated.

Mr. Trungale’s findings were not surprising, and simply confirmed what the Whooping Crane International Recovery Team, USFWS, and TPWD officials had observed and warned about in prior years: decreased freshwater inflows correlate with higher crane mortality. For example, the Whooping Crane International Recovery Plan of 2007, published by the USFWS, recognizes that, in Texas, the largest threat to the AWB flock’s survival is the reduction in freshwater inflows:

Freshwater inflows. Currently, expanding human populations throughout the range of the whooping cranes continue to threaten survival and recovery of the birds. Impacts are particularly severe on the winter grounds. Freshwater inflows starting hundreds of kilometers inland, primarily from the Guadalupe and San Antonio rivers, flow into the Whooping Crane critical habitat at Aransas; these inflows are needed to maintain proper salinity gradients, nutrient loadings, and sediments that produce an ecologically healthy estuary (TPWD 1998). Spring flows originating from the Edwards Aquifer are also crucial, especially in times of drought when they can make up 70% of Guadalupe River water. Inflows are essential to maintain the productivity of coastal waters and produce foods used by the whooping cranes. Coastal waters with low saline levels are maintained by these instream flows, providing drinking water for cranes that would otherwise fly inland for freshwater.

TPWD has recommended target inflow levels needed to maintain the unique biological communities of the Guadalupe Estuary (TPWD 1998), which includes Whooping Crane critical habitat. Unfortunately, mechanisms to guarantee these flows are not provided by Texas water law, and critics have challenged the size of the target inflows.

.....

Upstream reservoir construction and water diversions for agriculture and human use reduce freshwater inflows. Many existing water rights are currently only partially utilized, but greater utilization is expected over time. Water rights continue to be granted on the Guadalupe, and some sections of the river are already over-appropriated.

PX-11 at 21 (emphasis added).

On March 30, 2007, the Executive Director of the Texas Parks and Wildlife Department signed in concurrence with the findings and opinions of the Recovery Plan. (Archibald, Day 1, Tr 81-82); PX-11. Moreover, the State of Texas has previously recognized the significance of freshwater inflows, with one published study specifically calling for a guaranteed minimum annual inflow of 1.1 million acre-feet for San Antonio bay. (Trungale, Day 3, Tr 294-295); PX-382. A similar recommendation was made in a more recent state study on recommended inflows by TCEQ's Guadalupe-San Antonio BBEST. (Trungale, Day 3, Tr 294-295).

In 2009, the USFWS identified the Whooping Crane as one of their “spotlight species,” a species chosen for particular attention and a focus on recovery efforts. See PX-25. The Spotlight Species Action Plan for the Whooping Crane acknowledges that the critical habitat of the AWB flock is threatened, and it specifically addresses water diversions and decreased freshwater inflows:

At Aransas National Wildlife Refuge (NWR) and throughout the central Texas coast, ***decreases in freshwater inflows from water diversions and reservoir construction*** add to the following threats: reduction in available main food items at Aransas NWR, the blue crab (*Calinectes sapidus*) and wolfberry (*Lycium carolinianum*) [and] Increased intervals when winter marsh salinities exceed the threshold of 23 parts per thousand (ppt) thereby decreasing the availability of fresh drinking water for the cranes.

PX-25 at 1 (emphasis added). As discussed in more detail below, the decreased inflows and higher resulting salinities across the whooping cranes’ habitat causes a reduction in the birds’ primary food resources, blue crabs and wolfberries, as well as drinking water.

3. Dr. Ward’s modeling not reliable.

GBRA witness Dr. George Ward reviewed Mr. Trungale’s modeling.⁴⁹ (Ward, Day 7, Tr 97-98). Dr. Ward was offered without objection as an expert on circulation, salinity, distribution, hydrology and modeling. Id. Tr 109.

Dr. Ward characterized the San Antonio bay/Guadalupe estuary as a “sluggish responder” to salinity because its exchange with the sea takes place up and down the coast, rather than at a direct entrance. (Ward, Day 7, Tr 127-28). When a freshwater pulse enters the San Antonio bay/Guadalupe estuary, it displaces water, and if the pulse is large enough, it pushes

⁴⁹ Dr. Ward is a research scientist at the University of Texas-Austin, and the associate director of the Center for Research and Water Resources. (Ward, Day 7, Tr 97-98). He is a member of the Science Advisory Committee in connection with Senate Bill 3. Id. Tr 107. His CV is DX-272.

freshwater into the surrounding estuary and even out into the adjacent Gulf of Mexico. Id. Tr 128. The salinity then works its way back into the system by tidal exchange, internal circulations, density currents, and turbulence, and these processes are collectively referred to as “salinity intrusion.” Id.

Dr. Ward used the same models as Mr. Trungale (no water diversions, historical diversions, and full permit diversions), and concluded that the average salinity in the San Antonio bay/Guadalupe estuary under the three Trungale scenarios varied only by approximately 1.5 ppt. (Ward, Day 7, Tr 128). Ward characterized this variance as simply “noise” in the natural variability. Id. Tr 132-36. Dr. Ward arrived at this conclusion by averaging the geographic distribution of salinities modeled by Mr. Trungale. (Ward, Day 7, Tr 134) (“Now, to try to compress this variation into something that’s more assimilable to our human minds, I’ve just averaged them.”).

Nowhere does Dr. Ward explain adequately why this manipulated use of average salinity across the entire bay system is a better, or even relevant, measure. To the contrary, Dr. Ward admitted that the key aspect of an estuary is the geographic distribution of salinity gradients:

Q. Now, in your review of – in your critique of Joe Trungale’s work, you didn’t mention anything about geographic coverage, right?

A. That’s correct.

Q. And isn’t, in fact, the geographic distribution of various salinities a key aspect of the estuary?

A. It is.

(Ward, Day 7, Tr 153); DX-280. And Dr. Ward testified that “the intent of TxBlend is to predict salinity throughout the bay[/estuary].” Id. Tr 155. Yet Dr. Ward decided that the results of

TxBend are “very complicated” so he chose to “pre-digest” and “summarize” the results in his testimony. Id. His summary consisted of one number—an average salinity—to take the place of *thousands* of data points describing how salinity changes throughout the bay, both geographically and temporally. DX-424. This manipulation of the data produced no meaningful results for the Court, and did not cast doubt on the conclusion that water diversions result in higher salinities to the San Antonio bay/Guadalupe estuary, the critical winter habitat of the whooping cranes.

4. Dr. Montagna’s observations and studies confirmed Trungale’s modeling.

Dr. Paul Montagna is an expert in Texas estuaries: he is the endowed Chair for Ecosystems Studies and Modeling at the Harte Institute at Texas A & M Corpus Christi; he is a professor of Physical and Environmental Sciences; and he is the Coordinator for the Coastal and Marine Science Doctoral Program.⁵⁰ (Montagna, Day 3, Tr 171). He has worked in primarily two areas: (1) offshore oil and gas and deep sea ecology; and (2) estuarine research related to fresh water inflow. Id. Tr 173. At the time of trial, he was leading the research for NOAA on the oil spill associated with the Deepwater Horizon blowout. Id. He has studied and attempted to determine the environmental inflows needed for Corpus Christi bay and San Antonio bay. Id. Tr 174.

Dr. Montagna described an estuary as “a semi-enclosed body of water, where freshwater and marine water mix. (Montagna, Day 3, Tr 176). Nearly all coastal zones in the world are estuarine environments. Id. There is always movement of water from the tides, and it is the

⁵⁰ Dr. Montagna’s résumé is PX-258.

mixing of fresh and marine water that “makes estuaries the most productive environments on earth.” Id.

TAP exhibit PX-59 is a diagram of the habitats and geomorphological components of bar-built estuaries. (Montagna, Day 3, Tr 178). With Texas coasts, the beach is on a sand bar that essentially separates the bay/estuary from the ocean. Id. Tr 178. The bay closest to the ocean is referred to as the “primary bay,” and the bay into which the river flows is referred to as the “secondary bay.” Id. There is a gradient in habitats with more marsh habitats and oyster reefs near the rivers, and more beach habitats with sea grass beds near the ocean. Id. Tr 178-179. The most important aspect of the fresh water inflows is that it creates the very gradient of salinities across the bay to support the variety of communities and organisms that live there. Id. Tr 181.

Dr. Montagna’s testimony affirmed Mr. Trungale’s modeling that water diversions decrease freshwater inflows to the Refuge. TAP exhibit PX-60 is a diagram of diverted freshwater inflows. (Montagna, Day 3, Tr 181). When a diversion of freshwater occurs, for example by a dam across a river or impoundment, the water flow is decreased and the dilution power of rain water is lowered, increasing salinity in the bays. Id. Tr 182. In addition, a reduction in river inflows means a reduction in dissolved nutrients and organic matter to the bay, as well as a reduction in sediments. Id. If sediments get stopped behind a dam, there is less buildup of sedimentation in the marshes, and that could actually cause erosion rates to increase. Id. PX-61 is a conceptual model of inflow effects. Id. Tr 183. PX-61 demonstrates that freshwater inflows create the estuary conditions in the context of salinity, sediments, dissolved materials, nutrients, organic matter, and also particulate matters. Id. The biology within the

estuary responds to the estuary conditions, which are determined by the freshwater inflows. Id. Tr 183-184.

Dr. Montagna testified about his work on the Science Advisory Committee in connection with another S.B.3 region, the Nueces Bay, which is south of the San Antonio bay/Guadalupe estuary.⁵¹ (Montagna, Day 3, Tr 187). Although the purpose of the S.B.3 process is to develop environmental flows for the particular bay/estuary system, in the case of the Nueces Bay, it is no longer “ecologically sound.” Id. In the 1930s, the Nueces Bay was low saline and productive. Id. Indeed, the Nueces Bay fossil record reveals that the area once supported large populations of rangia clams, bivalves that required very low salinities, from zero to ten ppt. Id. Tr at 193. However, as a result of the drought and the two dam systems, including Choke Canyon, conditions in Nueces Bay have changed dramatically; certain areas in Nueces Bay have salinities up to 45 ppt, which is 50 percent greater than sea water. Id. Tr 188. According to Dr. Montagna, human water management killed the Nueces Bay estuary. Id. Tr 194.

The Nueces River Basin originates in Edwards County and flows southeast for approximately 315 miles to Nueces Bay near Corpus Christi. The Nueces River basin is located approximately 50 coastal miles to the southwest of San Antonio bay.

Mr. Vaughn is a BBEST scientist for both the San Antonio bay/Guadalupe estuary and for the Nueces Bay/Nueces estuary. In determining the salinity recommendations for the Nueces bay and estuary, the BBEST team chose five indicator species which had known salinity

⁵¹In Dr. Montagna’s opinion, the S.B. 3 process of developing recommended inflows is hampered at the onset by the mandatory consideration of previously permitted water. (Montagna, Day 3, Tr 189). Indeed, because all existing permit right owners were “grandfathered” under S.B.3, the BBEST and BBASC teams have to work with the water that’s “left over.” Id. The process is further hampered because, of the permitted water, not all of it is being used. Id. Tr 191. In addition, there are little conservation restrictions in the existing permits. Tr 192.

preferences which could be related to freshwater inflow, one of which was the blue crab. (Vaugh, Day 7, Tr 215-216). The BBEST team recommended a preferred salinity level of 18 ppt for Nueces Bay. Id. However, for the San Antonio bay/Guadalupe estuary, the BBEST team did not use the blue crab. Id. Tr 213. Dr. Ward acknowledged that, despite the proximately and connectivity of the San Antonio and Nueces bays, the Nueces BBEST researchers employed the boost regression tree and the San Antonio team did not, so the blue crab was not selected as a focal species. Id. Tr 215. Dr. Ward admitted that this lawsuit was pending at the time of the San Antonio BBEST's recommendations.

One effort to restore the Nueces Bay is to pipe water directly to the marsh, and the U.S. Army Core of Engineers is conducting a field study concerning a restoration program. (Montagna, Day 3, Tr 194). However, the system will never support rangia or oysters again. Id. Tr 195. The Nueces Bay is a cautionary tale for the San Antonio bay/Guadalupe estuary. Id. If water management authorities continue to allow the storing of huge reservoirs of water, the estuarine bays no longer receive significant freshwater inflows, and the Guadalupe estuary could suffer the same high salinities and loss of species life as Nueces Bay/estuary. Id. Tr 196. However, there is still a chance to save the San Antonio bay/Guadalupe estuary because it is still "in pretty good condition." Id. Tr 197. The system can "rebound" from the negative effects of low inflow years if followed by good inflow years. Id. The real challenge is human behavior, because there have always been variations from year to year regarding rain and drought, and the organisms that live there have a certain ability to deal with that variability. Id. Tr 198. Water diversions are the problem, and in times of drought, "everyone should suffer equally." Id.

5. Dr. Davis' modeling.

SARA witness Dr. Stephen Davis is with the Everglades Foundation.⁵² In 2003, he helped design the methods for collecting data for a study of the San Antonio Guadalupe Estuarine System (“SAGES”) report. (Davis, Day 8, Tr 9). The SAGES report was funded by two of the intervenors herein, GBRA and SARA, as well as the San Antonio Water System, an intervenor. (Slack, Day 4, Tr 143).

For the SAGES report, Dr. Davis examined freshwater inflows and spatial patterns and water quality on three study sites along the north side of the San Antonio bay/Guadalupe estuary. Id. Tr 13-14. He employed data collected from “TCOON,” the Texas Coastal Ocean Observation Network, which has a series of monitoring sites across the Texas coast, primarily focused in bays and estuaries, that measure everything from water level to wind, salinity, pH, and other water quality parameters. Id. Tr 14-15. Dr. Davis testified that during “high water” periods, the tidal creeks and ponds on his study sites were connected, but during the “low water” periods, they were separated. Id. Tr 21-22; DX-400. The terms “high water” and “low water” are not related to high tide or low tide; prolonged periods exist where the pools are either connected or isolated. Id. The longer any pools remain disconnected, the greater the chances are of those pools drying out completely. Id. During a high water period, the estuary is inundated with water that facilitates the connection between bay waters, tidal creeks, and the isolated ponds. Id. Tr 23. This high water time allows for flushing of the salts that accumulated when water levels are low. Id. During the low water times, the soils become hyper-saline, up to 70 to 100 ppt. Id. The flushing that occurs with high water helps make the soil more favorable for marsh vegetation. Id. For the biota, the high water periods allow access to the estuary for fish,

⁵² Dr. Davis’ CV is DX-307.

crabs, and other invertebrates. Id. Tr 24. The estuary is an important source of food, and also provides a refuge against large predators. Id. Tr 24.

On cross-examination, Dr. Davis admitted that, when prevailing winds come across the coast, water measurements would be higher on the south side of the bay/estuary while dropping on the north side. Dr. Davis' measurements only included the north side. (Davis, Day 8, Tr 64). Moreover, his measurements involved areas primarily *not* located on the Refuge itself. Id. Tr 65. Dr. Davis did not relate his testimony to Whooping Crane mortality or blue crab abundance. Id. Tr 60. He did not record any water levels in the bay/estuary during the 2008-2009 winter, nor did he offer any evidence that the tides were particularly low for the 2008-2009 winter.

The testimony of Mr. Trungale, that in 2008-2009, the salinities across the San Antonio bay/Guadalupe estuary would have been lower but for TCEQ's authorized water diversions, stands un-rebutted.

C. Higher salinities adversely affect blue crabs and wolfberries.

TAP presented evidence that, higher salinities in the bay/estuary, adversely affect the availability of blue crabs and wolfberries, the primary food resources of the cranes. Dr. Montagna testified that presently, the San Antonio bay/Guadalupe estuary typically has a brackish environment, between 15-25 ppt,⁵³ and the salinity gradient extends across the entire area, which "means that the entire bay winds up being an especially productive habitat." (Montagna, Day 3, Tr 200). The system is dynamic and salinity changes can occur day to day, even hour to hour, with tides and other factors. Id. Tr 201. Also, because it covers a larger area,

⁵³ Dr. Montagna testified as to salinity measurements. (Montagna, Day 3, Tr 200-201). Usually, salinity is measured with a refractometer or an electronic gauge meter that measures in "practical salinity units" (psu), while parts per thousand (ppt) implies the technique of evaporating the water and measuring the remaining salt. Id. The measurements are functionally the same. Id. Tr 200.

its productivity is across a wide range of salinities. Id. Tr 202. Both productivity and resilience to change are a function of habitat size and in these instances, the larger the better. Id.

1. Dr. Montagna on salinity preferences of blue crabs.

In connection with his evaluation of the salinities in different bays, Dr. Montagna has had the opportunity to study blue crabs. (Montagna, Day 3, Tr 203). TAP's exhibit PX-68 is a conceptual model of the blue crab life cycle.⁵⁴ The cycle begins with an adult female crab and egg sac. Id. The females migrate to the higher salinity zones where they release their eggs into the ocean, but remain close to the pass, where the bay and ocean meet. Id. Tr 204. The larvae that are released from the eggs pass through a series of stages. Id. Initially, they are plankton and live primarily in the ocean. Id. As the tides come in, plankton have behaviors which allow them to ride the current and move into the bay/estuary when the tide is flooding, and move out of the current when the tide is ebbing, so they do not lose ground, and eventually, the smaller ones wind up in the fresher parts of the bay/estuary further inland. Id. These small crabs seek the estuary because it is rich with nutrients, and this is one reason why estuaries are known as "nurseries" because so many species return to this area for the food supply and to develop and grow larger. Id. Tr 205. The estuary is the "ideal environment" for young crabs because they can hide from predators in the marshes, and the area is nutrient rich, thus increasing their chances of survival. Id. Tr 207. Blue crabs are found in basically all salinities, from the ocean to the river mouth, and this gradient of salinities directs the blue crab in its life cycle. Id.

⁵⁴ Interestingly, about 95 percent of all commercial and recreational species have "this exact same kind of a life cycle" as the blue crab. (Montagna, Day 3, Tr 203).

Between 1980 to 2009, there has been a significant decline in blue crab abundance over the entire Texas coast. (Montagna, Day 3, Tr 208). And see PX-69, graph of blue crab abundance measured in trawls⁵⁵ from 1980 to 2009. Over-fishing plays a role in the decline, but while fishing regulations have become more stringent, the blue crab population has still not rebounded. Id. Tr 209. There is likely a climate component to the decrease. Id. However, there is simply no dispute that “blue crab abundances today are at historic lows, and that the blue crab populations themselves are highly threatened.” Id. Tr 210. Given the long-term trend, this makes fluctuations in salinities within a particular bay system “critical.” Id.

Another important aspect of salinity is that disease organisms have a preference for higher salinities. (Montagna, Tr 211). Indeed, when female crabs depart for the ocean to release their egg sacs, the males remain in the lower salinity parts of the bay to avoid parasites. Id.

In 1985, after the TCEQ was first charged with considering the impact to bays and estuaries when a permit is requested, officials looked to see what available data might be useful. (Montagna, Day 3, Tr 213). The TPWD had previously collected monitoring data which included dissolved oxygen, salinity, temperature, depth of sample, and other information that could be used to examine freshwater inflow needs.⁵⁶ Id. Tr 214. Mr. Trungale employed a statistical model, the Boosted Regression Tree (BRT),⁵⁷ to evaluate the existing data from San Antonio bay/Guadalupe estuary. Id. Tr 213-14, 217. The BRT results confirmed that blue crabs’

⁵⁵ In commercial fishery, crabs are caught with pots, but the trawl numbers were used as an independent measurement of the status of the population. (Montagna, Day 3, Tr 209).

⁵⁶ This data had been collected with regards to creating fishing regulations, not to examine salinity gradients within specific estuaries. (Montagna, Tr 214).

⁵⁷ BRT analyzes multiple predictive variables that impact crab catches (*e.g.*, salinity, temperature, depth, time, dissolved oxygen) to create a regression equation. Id. Tr 214, 218-220, 228; PX-246, PX-247.

preferred salinity range is between 10-20 ppt, with reductions at 22 ppt, and a “sharp drop” above 25 ppt. Id. Tr 215, 224-25; PX-248.

The BRT regression equation can also be used in combination with the geographical data to predict the distribution of blue crabs and how the distribution changes with salinity. (Montagna, Day 3, Tr 227-228). Dr. Montagna incorporated the BRT statistical information into a mapping system to graph the relationship between changing salinities and the chance of a Whooping Crane finding a blue crab in that area. Id. Tr 230-31. See PX-249; PX-250. As expected, with lower salinities, the greater the chances for a Whooping Crane to find a blue crab. Id. Tr 228.

2. Dr. Miller’s blue crab data.

In rebuttal to Dr. Montagna, defendant-intervenor GBRA offered witness Dr. Thomas Miller, the director of the Chesapeake Biological Lab in Maryland.⁵⁸ He testified as to the life cycle of the blue crab, and noted that blue crabs need access to high salinities at the zoea⁵⁹ stage; however, in direct contrast to Dr. Montagna’s findings, he opined that blue crabs had no physiological need for low salinities. (Miller, Day 7, Tr 225-35). However, on cross-examination, Dr. Miller agreed that, while the blue crab might not require lower salinities biologically, the estuary and its freshwater inflows provide important nutrients, like nitrogen and phosphorus to the blue crabs. Id. Tr 257-58. He acknowledged that some plant species necessary to the blue crab’s habitat, such as *Spartina alterniflora*, require lower salinities. Id. Tr

⁵⁸ His CV is DX-257.

⁵⁹ The “zoea” stage is the free-swimming planktonic, larval form of crabs and other decapod crustaceans. Dr. Montagna testified to this same fact: that the blue crab larvae are released by the adult females into the ocean water. (Montagna, Day 3, Tr 204).

259. He admitted that some blue crab parasites are more prevalent in high salinities. Id. Tr 262. He conceded that, although there are viral infections that exist in freshwater that are more dangerous than parasites, those have only been reported in Mississippi, not Texas. Id. Tr 265. Thus, Dr. Miller offered no evidence to refute the importance to the blue crabs of the estuarine environment with corresponding freshwater inflows.

Dr. Miller discussed commercial crabbing along the Texas coast as a possible reason for blue crab decline as opposed to freshwater inflows. (Miller, Day 7, Tr 252). However, he offered no evidence to suggest that commercial crabbing was more extensive in 2008-2009 to have adversely affected the blue crab population, and in turn, the whooping cranes.

In the Recovery Plan, the report cites to a study by Longley in 1994 who determined that: “A simple inverse relation exists between blue crab catch rates and mean salinity within an estuary.” (PX-11 at 21). The Court finds that the preponderance of the accepted and sound scientific evidence establishes that an increase in bay/estuary salinities results in a decrease in blue crab abundance.

3. Wolfberry production.

Dr. Davis testified that salinity is an important factor for wolfberry production. (Davis, Day 8, Tr 66-70). In his SAGES report, he found that lower salinity levels in the summer led to increased fall fruit production at all three study sites. Id. Tr 70. He also testified that laboratory experiments confirm lower salinities are better for wolfberry fruit production. Id. GBRA witness Dr. Slack agreed that “having more freshwater inflows is beneficial to wolfberry production.” (Slack, Day 6, Tr 168, 173, 206).

4. Observations and measurements concerning blue crab abundance and wolfberry availability in 2008-2009.

As will be discussed in more detail below, the crane experts each testified as to the importance of the blue crab and wolfberry fruit in the crane diet, and their personal observations were confirmed by fecal studies. (Archibald, Day 1, Tr 73; Chavez-Ramirez, Day 2, 73-77). Mr. Stehn testified that, in 2008-2009, wolfberry production in the fall was “notably less than average.” (Stehn, Day 3, Tr 28-29). Both Mr. Stehn and Dr. Chavez-Ramirez noted significantly reduced blue crab catchings by the cranes that winter. See PX-22. The preponderance of the credible evidence establishes that decreases in freshwater inflows to the San Antonio bay/Guadalupe estuary results in a decrease in blue crabs as well as wolfberries on the critical habitat of the AWB cranes.

D. Statistical modeling confirms higher salinities are associated with higher crane mortality on the Refuge.

TAP witness Dr. Ronald Sass is the former chair of Ecology and Evolutionary Biology at Rice University, and is currently an Emeritus Professor, a fellow of the Baker Institute of Public Policy, author of 165 peer-reviewed papers, including one on whooping cranes, and a shared recipient of the 2007 Nobel Peace Prize as a member of the Intergovernmental Panel on Climate Change. (Sass, Day 1, Tr 177-180). He is a biogeochemical expert in earth systems, including hydrologic and ecological aspects, and the statistical analysis of those systems.⁶⁰ He was asked to investigate the relationship between freshwater inflow and AWB crane mortality. (Sass, Day 1, Tr 182-83). Using Mr. Stehn’s mortality data, and freshwater inflow data, PX-266, Dr. Sass found a statistically significant association between years of high crane mortality and low July through December freshwater inflows. (See e.g. PX-75, a graphic representation of the

⁶⁰ His résumé is PX-260.

relationship between AWB crane mortality with freshwater inflow into the San Antonio bay estuary system; PX-76, Bar graph of Whooping Crane mortality and freshwater inflows).

Dr. Sass employed the Fisher Exact Probability Test to test the hypothesis that high crane mortality is associated with low freshwater inflows. (Sass, Day 1, Tr 198, 206); PX-265. He concluded that low inflows and high mortality are “causally correlated” and “in all cases of high mortality you have low river flow, no exceptions really.” Id. Tr 209-210. This conclusion is scientifically supported and explained by the biological reasons in the extensive literature. Id. Tr 183-185.

TAP witness Dr. Kathy Ensor is the current chair of the Statistics Department at Rice University and a fellow of the American Society of Statistics, among many other honors.⁶¹ She is highly recognized as an environmental statistician. Dr. Ensor reviewed Dr. Sass’s statistical results, and confirmed that he applied the Fisher Test correctly and appropriately. (Sass, Day 1, Tr 238). The result of the Fisher Test, (p-value = 0.02), demonstrates that there is a strong association between the level of freshwater inflows into San Antonio bay/Guadalupe estuary and AWB crane mortality. (Ensor, Day 1, Tr 239). Additional statistical tests using the same data as Dr. Sass confirmed the statistically significant correlation. Id. Tr 240. A significant relationship between levels of freshwater inflow to crane mortality means not occurring by chance. A Poisson Count Regression found a strong relationship (p-value < 0.0001) between low inflows and high mortality. (Sass, Day 1, Tr 241); PX-27; PX-28. Statistics can support a finding of causation when paired with a scientific argument or a biological explanation for that causation and here it does so support. (Ensor, Day 1, Tr 241-242).

⁶¹ Her résumé is PX-256.

As rebuttal to Drs. Sass and Ensor, GBRA offered Samuel Vaughn, a registered professional engineer who is employed at HDR Engineering in Austin.⁶² His expertise is in river basin hydrology, regional water supply planning, water rights permitting, river basin modeling, and statistical analyses. (Vaughn, Day 7, Tr 173-74). He serves on three BBESTs including the San Antonio bay/Guadalupe estuary, as well as for Nueces, and Sabine-Neches. Id. Tr 177. He served as a member on the Edwards Aquifer Habitat Conservation Plan. Id.

Mr. Vaughn testified that his current employer, HDR Engineering, provides services to two intervenors, GBRA and SARA. (Vaughn, Day 7, Tr 202). He reran Dr. Sass' analysis concerning freshwater inflows and crane mortality, and he "did get the same answer." Id. Tr 207. He also ran a number of statistical tests, but he did not use winter crane mortality, but instead, *annual* crane mortality. Id. Tr 208-209. He decided that winter crane mortality was not a reliable count and instead viewed the health of the ABW crane "as a year round process." Id. Tr 209. However, he admitted that he had no scientific basis for employing annual mortality: he is not an ornithologist or a naturalist or a biologist. Id. Tr 210. The Court ruled that Mr. Vaughn was not qualified as an expert on selecting crane mortality data and applying it statistically. Id. Tr 212.

E. At least 23 Whooping Cranes died on the Refuge in 2008/2009.

In 1941, the total population of Whooping Cranes worldwide had been reduced to just 15 birds.⁶³ (Archibald, Day 1, Tr 59). Through conservation efforts, the AWB flock has slowly

⁶² Mr. Vaughn's CV is DX-241.

⁶³ When the crane population was reduced to just 15 birds, DNA evidence suggested that there were only three reproductively active females, and geneticists predicted that this population could not survive because of inbreeding. (Archibald, Day 1, Tr 76). Thus, through his "dancing" efforts with Tex, Dr. Archibald personally contributed to the AWB flock's genetic survival.

grown to that of almost 300 birds.⁶⁴ Id. As such, the AWB flock has become an international symbol of conservation success, “recovering from the brink of extinction.”⁶⁵ Id.

Testimony regarding the many deaths of AWB cranes in 2008-2009 came primarily from three witnesses: Dr. George Archibald; Dr. Felipe Chavez-Ramirez, and Mr. Tom Stehn. Dr. Archibald, Dr. Chavez-Ramirez, and Mr. Stehn, have been recognized as the leading authorities in their fields of biology, ornithology, and whooping cranes in particular. Dr. Archibald is a renowned expert on all cranes of the world, and he has been actively involved in Whooping Crane conservation efforts since 1966.⁶⁶ (Archibald, Day 1, Tr 56). Since 1990, he has been a

⁶⁴Compared to other endangered crane species, the Whooping Crane has by far the smallest wild population with around 300 individuals; the next rarest, the Japanese crane, has 2,800 birds, followed by the Siberian crane in Russia, with a population of 3,500. (Archibald, Day 1, Tr 69).

⁶⁵However, a wild population of 300 is still quite low, and therefore, the Recovery Team has expended considerable effort and funds in an attempt to establish other populations of whooping cranes in other parts of the continent, as well as to breed alternative flocks. Archibald, Day 1, Tr 69-70). Dr. Archibald detailed four experimental efforts: In 1966, twelve eggs were collected from the AWB flock at their breeding grounds in Canada and taken to the USFWS Patuxent Wildlife Research Center in Maryland where they were hatched. Id. By 1975, those birds began to breed in captivity, and today, there are 150 whooping cranes in captivity. Id. From this captive population, the Crane Foundation has attempted to reintroduce birds into the wild in Idaho and in New Mexico. Id. In 1975, Whooping Crane eggs were placed in the nests of sandhill cranes, which are abundant in the Rockies. Id. The program was successful to the point that the sandhill cranes raised the whooping cranes and the whooping cranes migrated with the sandhill, but the whooping cranes did not breed, and the program was discontinued. Id.

Years ago, whooping cranes bred in the wild in Louisiana; however, they were hunted extensively and the last birds in that area died in the 1940s. (Archibald, Day 1, Tr 71). In 1993, the Recovery Team released 289 captivity-raised birds into the Florida marshlands, however today there are less than 20 of those birds alive. Id. In Florida, the increasing human population and the demands on the water table caused the wetlands to collapse. Id. Although the Florida whooping cranes were successful in breeding in the wild, with 10 chicks produced that fledged, the rate of reproduction could not keep up with the rate of mortality, and the program was discontinued in 2004 as a failure. Id.

There was a third experimental program to increase the Whooping Crane population conducted in Wisconsin in 2001. (Archibald, Day 1, Tr 71). That program involved teaching captivity-raised birds to fly behind an ultralight aircraft to Florida for the winter, in conjunction with releasing some captivity-raised birds directly to the wild flock. (Archibald, Day 1, Tr 71). That program shows some promise. Id. Tr 72. The final experiment of the Crane Foundation began in February 2012, when ten captivity-raised whooping cranes were released into Louisiana in an attempt to start a non-migrating flock. Id. In December 2012, 16 additional birds were released to that flock. Id. All of these are experimental populations, with those in Idaho and Florida declared failures, and the programs in Wisconsin and Louisiana classified as tentative. Id.

⁶⁶ A copy of Dr. Archibald’s résumé is found at PX-254.

member of the International Whooping Crane Recovery Team, a joint effort between Canada and the United States to identify the problems facing Whooping Crane sustainability and to propose solutions to those problems.⁶⁷ Id. Tr 57-58. He is co-founder of the International Crane Foundation, and a MacArthur Fellow. Id. Tr 59.

Dr. Felipe Chavez-Ramirez is currently employed by the Gulf Coast Bird Observatory in Lake Jackson, Texas, a nonprofit conservation organization created to protect the migratory bird habitat along the Gulf Coast of Mexico.⁶⁸ (Chavez-Ramirez, Day 1, Tr 253). He is a member of the International Whooping Crane Recovery Team and of the International Union for Conservation of Nature (IUCN) Crane Specialist group. Id. He conducted his PhD research on foraging and energetics of cranes at the Aransas Refuge during the winters of 1992-1993 and 1993-1994,⁶⁹ and he continued with over two decades of field research on the AWB flock. Id. Tr 253-303.

Mr. Tom Stehn was the Refuge's biologist for 29 years, and he developed a methodology for counting the AWB cranes via aerial surveys and crane behavior.⁷⁰ (Stehn, Day 2, Tr 296-

⁶⁷ Dr. Archibald's commitment to the survival of the species is illustrated in this narrative: In 1967, there were two wounded whooping cranes at the San Antonio Zoo, and they produced a single offspring named "Tex." Id. Tex had health problems that necessitated hand rearing and, as a result, she imprinted on humans. Id. Tex did not meet another whooper until she was transferred to the U.S.G.S. Patuxent Center as a subadult. Id. In years of effort to pair her with a male Whooping Crane, Tex never laid a single egg; she rejected all advances from male cranes, and instead performed her courtship "dance" for her human keepers. Id. In 1975, Tex was sent to Dr. Archibald who "danced" with Tex for six years. In 1982, Tex was successfully artificially inseminated, resulting in a robust, male chick named "Gee Whiz." Id. Gee Whiz has gone on to be the father of many generations of whooping cranes, many of which are back in the wild. Id.

⁶⁸ A copy of Dr. Chavez-Ramirez' résumé is found at PX-255.

⁶⁹ GBRA witness, Dr. Douglas Slack, chaired the panel that reviewed Dr. Chavez-Ramirez' 1996 dissertation on food availability, foraging ecology, and energetics of the Whooping Crane.

⁷⁰ Mr. Stehn's qualifications were offered without objection on Day 2 at Tr 285-287 and 289-300.

297). He served as the USFWS' International Whooping Crane Coordinator and as a Recovery Team leader. Id. Tr 297. As the Refuge biologist, he authored the USFWS' annual report on the status of the AWB flock from 1985 until his retirement in 2011, including a special report concerning the 2008-2009 winter.⁷¹ Id. Tr 298. He has published 16 additional Whooping Crane manuscripts that were subject to peer-review. Id. Tr 298.

1. Counting cranes is rooted in crane behavior.

Dr. Archibald, Dr. Chavez-Ramirez and Mr. Stehn each testified and recognized that the task of counting cranes, and implicit thereto, determining a crane's absence or demise, is rooted in an understanding of the cranes' basic biology and behavior. Due to their size and color, cranes are highly detectable and conspicuous on their wintering grounds.⁷² (Archibald, Day 1, Tr 78). (See also PX-263, photograph of three whooping cranes; and DX-61, which includes hundreds of photographs of the AWB cranes). Crane families are cohesive and stay physically close together. (Archibald, Day 1, Tr 73; Chavez-Ramirez, Day 1, Tr 282-287). A juvenile will remain between 20 to 50 meters of one parent, and will immediately run to the parent if there is a disturbance or noise. (Chavez-Ramirez, Id.)

The AWB flock typically arrives at the Aransas Refuge in late October each year, with each family unit returning to its specific territory from years' prior. (Archibald, Day 1, Tr 72-73). The territories are between 200 to 400 acres. Id. Whooping cranes are territorial and will

⁷¹ Copies of Mr. Stehn's annual reports were introduced at trial. See e.g. PX-22, DX-6 (Winter 2008-2009 Report, Oct. 2009); DX-7 (Winter 2008-2009 Report, August 2010); DX-107 (Annual Report, May 2002).

⁷² An adult AWB crane is approximately 5 feet tall with a wing span of 7 to 8 feet. (Archibald, Day 1, Tr 78). Whooping cranes have an area of bare, red skin on the top of their heads and on their mustache, which they can expand and contract voluntarily to indicate their emotional state. Id. The red is expanded in times of aggression or sexual behavior. Id. The call of a whooping cranes can be heard over a range of miles. Id.

aggressively defend their defined territory against other individuals of the same species. (Chavez-Ramirez, Day 2, Tr 82). By excluding other members of the same species, the crane is maintaining access to all the resources within the boundaries of the territory for itself, mate, or offspring. Id. Tr 83. Whooping cranes are territorial on their breeding grounds in Canada, and also on their wintering grounds at the Refuge. Id. The only purpose for defending a territory at the wintering grounds is to procure food resources, because there is no nest to protect and the bird already has a mate. Id. Tr 84. (And Archibald, Day 1, Tr 73, winter territories protect resources).

As migratory birds, the AWB flock demonstrates site fidelity. (Chavez-Ramirez, Day 2, Tr 84). This means that the same individual birds return to the same exact location on the Refuge year after year. Id. This behavior has been confirmed by banding, as the same banded cranes return to their same established territories each winter. Id. Tr 85. In addition to site fidelity, whooping cranes exhibit site tenacity, which is the behavior of the whooping cranes to maintain their established territories. Id. Tr 87. Site tenacity has been demonstrated via the aerial surveys which show the same birds returning to, and remaining on, their specific site each winter. Id.

2. Tom Stehn determined peak population numbers for the USFWS.

As part of the international recovery effort, the USFWS has regularly monitored the whooping cranes at the Refuge, which is more accessible than the remote Canadian province where the birds summer. (Chavez-Ramirez, Day 1, Tr 73). Part of that monitoring includes population counts which have been conducted through aerial flights dating back to the 1950s.⁷³

⁷³ Aerial surveys are an accepted method of counting and monitoring many species of wildlife including polar bears, waterfowl, elk, and caribou. (Chavez-Ramirez, Day 2, Tr 32).

(Stehn, Day 2, Tr 290). Stehn has conducted these flights for 29 years, longer than any other USFWS employee.

Stehn's first aerial census flight was in the fall of 1982. (Stehn, Day 2, Tr 289). Census flights had been conducted prior to that time, dating back to 1950, and performed on a weekly basis. Id. Tr 90. Stehn flew with an experienced pilot, Robert Tanner, who had flown for the previous refuge biologist, in a Cessna 152. Id. Stehn observed how things had been done in the past, and then, from year to year, the program evolved and he had significant input into the census methodology. Id.

Both aluminum and color banding of whooping cranes began in 1981, so when Stehn first conducted aerial counts, he was able to utilize banding to help identify individual cranes. (Stehn, Day 2, Tr 290-291). To conduct a survey, the pilot would drop the plane from approximately 200 feet to between 20 to 50 feet above the marsh and salt flats of the estuary, and fly just to the side of the cranes. Id. Tr 291-292. Using his naked eye, not binoculars, Stehn would record the color bands he observed. Id. Tr 292. Any crane could have as many as four bands, and multiple passes were made to record all of the information. Id. In more recent years, Stehn did not employ as many low passes because the color banding had faded. Id. Tr 293. In addition, they were now flying a different plane, a Cessna 210, making slower speeds less safe. Id. Finally, federal regulations limited flight time while, simultaneously, the range of crane territories increased, and so in 2007-2008, low pass counting was eliminated. Id. Thereafter, aerial surveys in the Cessna 210 were conducted at approximately 200 feet for the duration of the flight. Id. Tr 294.

Each fall, in preparation of the cranes' arrival, Stehn began assessing the habitat, performing crab counts in October, while also monitoring salinities. (Stehn, Day 2, Tr 302). He would receive calls from the public along the migration route of the cranes notifying him about a possible sighting.⁷⁴ Id. Stehn would verify the sighting and effectively monitor the flock as it made its way south to the Aransas Refuge. Id. Tr 302-303. Once the birds arrived, he would begin his aerial surveys. Id. 304. From 1982 through September 2011, he was on all but two flights. Id.

Mr. Stehn's preference was to conduct a census flight every week, with a total of 26 flights per season.⁷⁵ (Stehn, Day 2, Tr 304). In recent years, due to increased expenses and funding cutbacks, the number of flights was reduced to between eight to twelve a season. Id. The aerial flights enabled Stehn to verify the location and mapping of territories (on the early flights); identify the mated pairs with their juveniles; determine peak population; record evidence of mortality; record evidence of mate switches; verify habitat use of AWB crane families; observe crane movement outside of the typical winter grounds; and record sightings of banded cranes. Id. Tr. 308. On the aerial counts, Stehn was: "... finding every bird, to the best of my ability. And we are covering every location where I believe a Whooping Crane may be." Id. Stehn also used watercraft to search for cranes.

⁷⁴ The AWB flock's breeding grounds in Wood Buffalo Park, Canada, are inaccessible to humans as there are no roads, and it cannot be reached by boats. (Archibald, Day 1, Tr 73). At the center of the Wood Buffalo Refuge, Whooping Crane pairs will have a nest, with two eggs, and usually produce one or two live chicks. Id. After the chicks are hatched and ready, the flock leaves Wood Buffalo in small groups and flies to Saskatchewan, Canada, where they remain for four to six weeks to build up their fat reserves before the long migration to Texas. Id. After Saskatchewan, the birds fly to the Aransas Refuge and its surrounding wetlands, returning to their established territories. Id.

⁷⁵ He continued to observe crane behavior by boat once a week also. (Stehn, Day 2, Tr 305).

In general, a flight would take 7.5 hours.⁷⁶ (Stehn, Day 2, Tr 309). When visibility was good, file-mile sections divided into quarter-mile grids were flown. Id. Tr 310. When visibility was an issue, the quarter-mile grids were reduced to 200 meters. Id. Tr. 310. During the flights, if there was a deviation from the transect route, grids would be repeated to ensure that the total known range of the AWB flock had been covered. Id. Tr 311. If birds were missing from their known territory, the territory would be revisited and the birds searched for at surrounding watering holes or uplands. Id. Tr 311-312. Each sighted crane was marked on a map of the territories, along with a checklist of known crane families, to build towards the peak population number as well as to determine if a crane disappeared from its previously observed territory. Id. Tr 313-314. During the return leg of the five-mile transect, previously observed cranes were confirmed. Id. Thus, for most flights, Stehn was able to see each territory at least twice each flight. Id. Immediately after the flight, Stehn reviewed the results of his counts while it was “fresh in [my] mind.” Id. Tr 315. Stehn has been observing some of the same cranes since 1982 and can identify individuals. Id. Tr 317. Stehn’s recognition of each individual crane enabled him to build “from week to week on what is out there” and ensure the accuracy of the counts. Id.

With the information gathered on these winter flights, Stehn determined a peak flock number each winter. To get the peak population number for the winter, Stehn analyzed the counts from the various flights. He calculated that, on an average flight, he was seeing approximately 95% of the flock. (Stehn, Day 2, Tr 319). Dr. Chavez-Ramirez confirmed this estimate. (Chavez-Ramirez, Day 2, Tr. 56-57) (stating the percentage of cranes counted was

⁷⁶ On occasion, there might be a late start due to fog; the flight time would then be reduced to 5 hours. (Stehn, Day 2, Tr 307).

between upper nineties and mid eighties depending on the flight). The peak population number for 2008-2009 was 270. (Stehn, Day 2, Tr 320); PX-22 at 21.

GBRA witness Dr. Michael Conroy did not challenge the peak populations counts of Mr. Stehn, as adopted and published by the USFWS. In fact, Dr. Conroy expressly agreed that Stehn's peak flock size counts were "reasonably accurate." (Conroy, Day 8, Tr 90).

3. Crane mortality counts.

In addition to the peak flock number, Stehn determined winter crane mortality. His methodology for counting crane mortalities was basically the same as for determining population counts because both counts happened on the same aerial survey. (Stehn, Day 2, Tr 308). Like population counts, Stehn's methodology for counting AWB crane mortality was based on crane biology and "behavior, of what I have been observing for 30 years." Id. Tr 321. To determine mortality, Stehn did not simply subtract one population count from another. Id. Instead, Stehn counted a mortality if a bird went missing from its known territory on two or more flights and was not relocated on subsequent flights. Id. Tr 324. That is, Stehn's mortality calculation was based on the sustained absence of a crane from its territory.⁷⁷ Id. Tr 321-322. If a crane disappeared from its known territory and did not return for the remainder of the winter, Stehn could reasonable conclude that the bird had died. Id. Tr 324. Stehn did not declare a mortality of an adult bird without repeated confirmation. Id. Tr 327; Day 3, Tr 61-62.

⁷⁷Dr. Chavez-Ramirez testified in detail about Whooping Crane territoriality, site fidelity, and site tenacity and confirmed that these behaviors could be used in counting cranes and in determining crane mortality. (Chavez-Ramirez, Day 2, Tr 84-85).

Stehn employed the same method to count juvenile mortalities because “the chick is always with the parents.”⁷⁸ (Stehn, Day 2, Tr 327). On the rare occasions when a juvenile was separated from its parents, such as before the spring migration, Stehn was able to find those solitary juveniles. Id. Tr 327. If a juvenile went missing from its territory, Stehn would immediately circle back to make sure he did not simply overlook the bird. Id. Tr 326. Later on the same flight, he made another pass through the territory. Id. Tr 326. On the next flight, looking for the missing juvenile was a top priority. Id. A juvenile was not declared missing or dead without “two or even three consecutive flights.” Id. Tr 327.

Mortality was inferred for only adults and their juveniles who went missing from their territories. Stehn did not attempt to count mortality of subadult birds,⁷⁹ which lack site fidelity, unless he found a carcass (which rarely happened, except in 2008-2009). (Stehn, Day 2, Tr 322-323). Stehn knew the number of pairs of adults, and knew the number of juveniles, and he used this knowledge to detect a mortality of those birds (not subadults). Id. Tr 324-325. In 2008-2009, the number of birds for which he sought to detect a possible mortality was 176 (70 adult pairs and 36 juveniles), not the peak population of 270. Id. Tr 324. Stehn replicated this same methodology for mortality counts each year. Id. Tr 322.

Stehn’s report for 2008-2009 concluded that at least twenty-three whooping cranes died that winter. See PX-22, “Whooping Cranes During the 2008-2009 Winter” (Stehn, Oct. 2009);

⁷⁸ Dr. Archibald confirmed this established behavior of parent and juvenile cranes. (Archibald, Day 1, Tr 74-75) Dr. Chavez-Ramirez also noted that crane families are cohesive and stay physically close together. (Chavez-Ramirez, Day 1, Tr 289). He testified that a juvenile will remain between 20 to 50 meters of one parent, and will immediately run to a parent if there is a noise or disturbance. Id.

⁷⁹ Subadults are younger, non-breeding adults that correspond roughly to teenagers. (Stehn, Day 2, Tr 325). They do not exhibit the same territorial behavior as adult Whooping Cranes. Id. Tr 323.

PX-3, Whooping Crane Mortality Table, 1989-2009 (USFWS, 2010). At trial, the Court asked whether Mr. Stehn was satisfied with the mortality number of 23 for the 2008-2009 winter. Mr. Stehn responded: “Yes, as a conservative, as a conservative number, yes.” (Stehn, Day 3, Tr 149). Stehn testified that the number of cranes that died in 2008-2009 was “higher than 23.” Id., Day 2, Tr 322. Stehn estimated the loss to likely be higher than 23 because, when he counted mortalities, he did not generally attempt to detect the deaths of the subadult birds, unless he found a carcass. Id. Tr 322-323, 325. Stehn testified that there were 92 subadults in 2008-2009, and he said it was “reasonable to assume” that some of those birds died that are not included in the count of 23. Id. Tr 323. Stehn described 2008-2009 as the worst year on record. Id., Day 3, Tr 24.

Dr. Chavez-Ramirez, who flew 30 to 40 times with Mr. Stehn, testified that, based upon his personal experience, there was “no way” and it would be “almost impossible” that 23 birds were simply overlooked for the entire 2008-2009 winter season. (Chavez-Ramirez, Day 2, Tr 59-60). Mr. Stehn testified about each of the 23 instances when he determined a crane had died during 2008-2009 and plotted those locations on a map. (Stehn, Day 3, Tr 15-24; PX-377). Stehn was able to assess mortality based on his knowledge of the specific territories, the crane’s habits, and his own detailed observations. Id. Tr 321.

In the 2008-2009 winter, four bird carcasses were recovered on the Refuge. Dr. Chavez-Ramirez testified that, between 1938 and 2011, less than 20 Whooping Crane carcasses in total had been recovered at the Refuge, four of which were in the 2008-2009 winter. (Chavez-Ramirez, Day 2, Tr 117). Dr. Chavez-Ramirez characterized the recovery of four carcasses as a

“strikingly high” number for a single species for one year.⁸⁰ Id. Tr 119. The discovery of an unprecedented four carcasses supports the data and opinions of Stehn, and the opinions of Drs. Archibald and Chavez-Ramirez, that a large number of whooping cranes died during the 2008-2009 winter.

4. Defendants’ and intervenors’ objections to mortality counts.

As rebuttal to Tom Stehn’s methodology for counting whooping cranes and determining mortality, defendant-intervenor GBRA offered the testimony of witness Dr. Michael Conroy, a research scientist at the University of Georgia, whose expertise is in applying statistical methods and mathematical modeling to analyze data from population surveys.⁸¹ He opined that Mr. Stehn’s methodology for determining ABW crane mortality was not reliable because “the detection rates are not perfect” on these surveys. (Conroy, Day 8, Tr 93-94). Dr. Conroy offered that radio telemetry or mark and recapture would provide more accurate data. Id. Tr 94. Although this does not take into account the dangers inherent with these methods of tracking Whooping Cranes. (Archibald, Day 1, Tr 170-171) (noting “capture myopathy,” which causes some birds to die simply due to the stress of being captured in order to be banded).

Dr. Conroy did not base this opinion on any personal observation of Mr. Stehn’s methods, and he admitted that he has no experience with Whooping Cranes; rather he merely reviewed the literature and the materials and summaries of Stehn’s reports provided to him by

⁸⁰ Other Refuge bird species, such as herons and egrets, are found in much greater numbers than the whooping cranes, and some species are present year round. (Chavez-Ramirez, Day 2, Tr 117-118). During his 300 days of field research over two winters, Dr. Chavez-Ramirez found maybe ten to twelve heron carcasses. Id. Tr 117-118. This comparison emphasizes how significant a number the four Whooping Crane carcasses represent. (Chavez-Ramirez, Day 2, Tr 119).

⁸¹ Dr. Conroy’s CV is DX-368.

GBRA's counsel. (Conroy, Day 8, Tr 101-103, 106-107). Dr. Conroy's stated reason for challenging Stehn's mortality count as unreliable was that non-detection could be confused with mortality. Id. Tr. 93. He argued that the presumed dead cranes might have simply been overlooked, was temporarily absent from the territory, or that it left the survey area. Id. Tr 93-94. But this opinion reflects Dr. Conroy's lack of experience with this species and its basic biology, and is flatly contradicted by the more experienced experts who know about whooping cranes, spent years working in the field with whooping cranes, and who also participated in the census flights. (Stehn, Day 2, Tr 289-291, 311-312, 317); (Chavez-Ramirez, Day 2, Tr 19, 25, 38, 59).

Moreover, Dr. Conroy eventually admitted that, given the known characteristics of whooping cranes—fixed territories, conspicuous individuals, identifiable by age—then sequential aerial visits would allow a person to infer mortality. (Conroy, Day 8, Tr 171-172). To the extent he argued against reliance on Mr. Stehn's findings, Dr. Conroy ignored the fact that Mr. Stehn would actively search for missing cranes each time, revisiting the territory several times on the same and subsequent flights. (Stehn, Day 2, Tr 308, 311-312)(Chavez-Ramirez, Day 2, Tr 59). Dr. Conroy ignored that Mr. Stehn would search the uplands and freshwater ponds for missing cranes. (Stehn, Day 2, Tr 311-312). Dr. Conroy ignored the undisputed testimony that if a crane is in an unusual location or off the Refuge, it is quickly detected and reported to USFWS by landowners, farmers and the public. (Stehn, Day 2, Tr 329-330).

Similarly, there is no evidence that missing juvenile cranes were somehow alive and hiding in their parents' territory or on the uplands, and eventually, Dr. Conroy conceded that Stehn detected most, if not all, juveniles present during each survey. (Conroy, Day 8, Tr 137).

There is also no evidence that the missing juvenile cranes were sighted off the Refuge. Instead, testimony established that they likely would have been reported because of the “spotter” network and the public awareness of the highly conspicuous cranes. (Stehn, Day 2, Tr 302-303, 330); (Archibald, Day 1, Tr 65); (Conroy, Day 8, Tr 129).

Subject to rare exceptions, such as at the very end of winter, or if the juvenile attached to a Sandhill Crane flock, juvenile whooping cranes do not survive on their own. (Stehn, Day 3, Tr 99-100) (“my 29 years of experience says the juvenile cannot survive.”). (Archibald, Day 1, Tr 151-152) (“Occasionally in biological systems, you’ll have everything happen. It’s what happens most of the time that’s significant.”). Thus when a known juvenile crane disappears from its territory, and is no longer seen elsewhere on or off the Refuge for the rest of the winter, Mr. Stehn justifiably concluded that it was dead.⁸²

Defendants and intervenors argue that, out of the 23 mortalities, only four carcasses were found. However, the credible testimony demonstrated that scavenging is the most reasonable explanation for why 19 carcasses were not discovered on the Refuge that winter. (Chavez-Ramirez, Day 1, Tr 116-117); (Conroy, Day 8, Tr 147-149, 151, 155-157). Dr. Chavez-Ramirez testified that there are at least eleven species of scavengers at the Refuge that would eat the

⁸² For example, Mr. Stehn testified about one separated juvenile that spent a few days on the tour loop road in 2008-2009, then was reported a mile north of the refuge, then disappeared with no further sightings. (Stehn, Day 2, Tr 329-330); PX107-109. Another example of Mr. Stehn's ability to detect mortality from his aerial survey comes was demonstrated in his testimony about the shooting death of a crane in 1989. He related: “When that crane was shot, I was actually up in the air doing a census flight. And when I landed and drove back to the refuge office, I reported, “We’ve got a missing adult out there.” And the secretary said, “Yes, we’ve been in touch with law enforcement, and there’s been a shooting.” (Stehn, Day 3, Tr 105). In short, Mr. Stehn knew during his aerial survey that a crane was missing within hours of the incident, and he was correct—that missing adult was a confirmed mortality. Id.; DX-168 at TS000569-570.

carcass of a dead Whooping Crane. (Chavez-Ramirez, Day 1, Tr 117). This explains why only approximately 20 Whooping Crane carcasses have been found at the Refuge between 1938 and 2010, four of which were during 2008-2009. Id. Tr 116-117). Dr. Conroy admitted that carcass persistence is low in rural environments, and he also agreed that there were many scavengers on the Refuge. (Conroy, Day 8, Tr 147-149, 151, 155-157) (82 percent of crow and sparrow carcasses disappeared within six days; 92 percent of song-birds within five days; only 2 chicken carcasses out of 275 lasted over twenty-four hours; 62 percent of duck carcasses in a Texas wetland were gone within three days). Thus, the evidence explained why nineteen out of the 23 crane mortalities lacked a carcass: crane carcasses quickly disappear in the wild and so they are unlikely to be found.

Tom Stehn's population and mortality data has been relied upon for decades by experts in the field. Stehn's methodology was not challenged until this litigation. Yet, even defendants' and intervenors' experts admitted to utilizing Stehn's mortality counts. See e.g. PX-391 at 3, SAGES report, where Dr. Slack acknowledges that mortality is "usually inferred from the disappearance of an individual from its territory."

F. Food stress caused the death of at least 23 cranes.

The credible evidence established that at least 23 whooping cranes died at the Refuge during the 2008-2009 winter. TAP's crane experts each testified that the birds' deaths were caused by food stress: the cranes' primary food sources, blue crabs and wolfberries, were not sufficiently available.

1. Necropsy findings.

Necropsies were performed on two carcasses recovered during the 2008-2009 winter. (See DX 118; DX-119). In the necropsy reports, emaciation is listed as one of the causes of death in each case. Id. (And Chavez-Ramirez, Day 2, 145). These reports are the best evidence of the cause of death of these two cranes.

2. Opinions of the crane experts.

Dr. Archibald testified that, in 1976, the Recovery Team identified water diversions and reduced freshwater inflows as adversely affecting the cranes' habitat by reducing their primary food sources, the wolfberry fruit and blue crabs, as well as freshwater for drinking. (Archibald, Day 1, Tr 86). Crane experts who studied at the Refuge over the years had previously observed that, when freshwater inflows were sufficient, there might be no crane mortalities, or just one or two. Id. Conversely, in times of drought or decreased freshwater inflows to the Refuge, there would be a spike in crane deaths. Id. These same experts noted that, when the inflows were down, blue crabs and wolfberries were less abundant. Id. Tr 110.

Dr. Archibald testified expressly that the most important food for the AWB cranes on their wintering grounds is wolfberries and blue crabs. (Archibald, Day 1, Tr 111). Cranes eat wolfberries for the months they are available, October through December. Id. Tr 113. Dr. Chavez-Ramirez' field research specifically looked at the AWB flock's diet. (Chavez-Ramirez, Day 2, Tr 18-68). Over the decades, biologists studying the whooping cranes have generated a list of approximately 50 food items that whooping cranes have been observed to eat at least once, and the food items that show up consistently are blue crabs, wolfberries, and insects. (Chavez-Ramirez, Day 2, Tr 69-70). (See PX-42, food items of wintering whooping cranes on the Texas

coast, compiled by Dr. Chavez-Ramirez based on his review of published literature). One of the earliest scientific papers on Whooping Cranes, authored by Robert Porter Allen in 1952,⁸³ includes fecal samplings, and he obtained similar results to those reached by Dr. Chavez-Ramirez. Id. Tr 72-74. Dr. Chavez-Ramirez' own fecal studies confirmed that blue crab and wolfberry were the predominant foods for wintering cranes.⁸⁴ Id. Tr 75-76. (See PX-52, plotting frequency of blue crab and wolfberry fruit in feces of AWB cranes in 1993-1994 winter). This predominance of food choice was demonstrated whether the birds were on the Aransas Refuge or Matagorda Island. Id. Tr 77. Throughout the reported scientific literature: "Blue crabs, hands down, [is] the most reported item by published research and other reporters." Id. Tr 78. In contrast to the SAGES report, Chavez-Ramirez stated that a Whooping Crane diet without blue crab, wolfberries, or freshwater would make the energy expended in a food search greater than the energy intake.

Dr. Archibald testified that, if the winter is divided into monthly segments, as he did with his fecal studies, there are some months where the blue crab or wolfberry is not as significant, and clams or snails may appear to be the predominant food that week; however, it is only for a short time.⁸⁵ (Archibald, Day 2 Tr 93).

⁸³ A copy of Dr. Robert Porter Allen's treatise, The Whooping Crane, Research Report No. 3 of the National Audubon Society (June 1952), was entered into evidence as PX-372.

⁸⁴ The graph also demonstrates that the presence of wolf berry fruit in the fecal matter declines sharply after December, consistent with wolfberry availability. (PX-52). Also, when wolf berry is most abundant, there is a slight decrease in blue crab found in the fecal samples. Id.

⁸⁵ Dr. Archibald testified that Hunt and Slack divided the winter into periods for their study, *Winter Diets of Whooping Cranes, Sandhill Cranes in South Texas*. DX-378A. In the Hunt and Slack study, blue crab frequency was 61%. (Archibald, Day 2, Tr 281).

Mr. Stehn testified that, based on his years of experience observing the AWB cranes: “it’s my opinion that whooping cranes really struggle when they don’t have their primary abundant food sources of wolfberry and blue crab.” (Stehn, Day 3, Tr 30). Dr. Chavez-Ramirez opined that without the blue crabs, he doubts that there would be enough food for the AWB cranes to survive, and that the flock “would either have to move or perish.” (Chavez-Ramirez, Day 2, Tr 94). Dr. Archibald noted that the AWB cranes’ territorial behavior, including site tenacity and fidelity, during the non-breeding winter season is a function of defending their food sources. (Archibald, Day 2, Tr 83-84, 87).

Mr. Stehn testified that, in 2008-2009, wolfberry production in the fall was “notably less than average.” (Stehn, Day 3, Tr 28-29). By December 2008, Stehn observed that: “... blue crabs were extremely scarce. And we noticed the whooping cranes were not feeding on blue crabs. What happens is the blue crab level gets so low that it’s not energetically feasible for a Whooping Crane to keep searching for crabs. And they have to go to other areas to look for food.” Id. Tr 29. Stehn testified as to his observations: “I was very, very concerned. I mean, I was seeing a horrible picture of habitat for the whooping cranes that winter, and I was extremely alarmed by it.” (Stehn, Day 3, Tr 28).

In response to Mr. Stehn’s concerns, Dr. Chavez-Ramirez spent five days at the Aransas Refuge in the 2009 winter. (Chavez-Ramirez, Day 2, Tr 68). During this time, he observed very low crab capture rates by the cranes. Id. Tr 68; DX-124 at TAP-006359. He also observed never-before seen behavior: a parent that was consuming a crab reacted aggressively when its juvenile approached, and refused to feed the crab to the juvenile. Id. Tr-97-98. Dr. Chavez-Ramirez opined that the parent was suffering from food stress, because normally the parent will

feed the juvenile first. Id. He also observed delayed molting in juveniles, and opined that it was because of decreased food availability, as growing new feathers involves significant energy. Id. Tr 114.

TAP's crane experts all testified that, early in the winter, juveniles are "extremely reliant" on the parents to provide food. (Chavez-Ramirez, Day 2, Tr 115; Archibald, Day 1, Tr 74-75). Parental denial of food to a juvenile "could be lethal in some cases." (Chavez-Ramirez, Day 2, Tr 132). Parental denial of food and/or aggression toward juveniles could lead to the juvenile's leaving the family unit and the territory, and would explain the unusual recorded observations of isolated solitary juveniles in years with low food abundance, including 2008-2009. Id. Tr 132-133; PX-22 at 31-32; PX-107, PX-108, PX-109.

In 2008-2009, out of the 23 reported mortalities, 16 were juveniles. (Chavez-Ramirez, Day 2, Tr 65). Dr. Chavez-Ramirez opined that this indicated food stress because juveniles are less able to procure their own food, and if the parents refuse to feed them sufficient amounts, then the juveniles are likely to suffer higher mortality. Id. Tr 115. In 2008-2009, Mr. Stehn noticed the "very unusual" occurrence that juveniles were separating from their parents. (Stehn, Day 2, Tr 328). Mr. Stehn explained that healthy juveniles typically stay near their parents, and when a juvenile separates from its parents, it invariably disappears. Id. Tr 330, and Day 3, Tr 19-20. Dr. Chavez-Ramirez testified that, of the few occurrences that he has seen solitary juveniles, those were only during "bad" winters. (Chavez-Ramirez, Day 2, Tr 132-133).

A lack of adequate food and drinkable water in the territories can cause the AWB cranes to leave and fly to the uplands to locate freshwater ponds. (Chavez-Ramirez, Day 2, Tr 115-116). Dr. Chavez-Ramirez testified that some cranes began to leave the marsh and vegetative

flats of the Refuge to fly upland to freshwater ponds when salinity levels reached 15 ppt, and that all cranes left when salinity reached 23 ppt. Id. Tr 242. Mr. Stehn drew these same conclusions based on his field observations, and he published these findings. (DX-123, Stehn & Taylor, 2007). When cranes are forced away from the safety of their territories they are at increased risk of predation. (Chavez-Ramirez, Day 2, Tr 116).

3. Defendants and intervenors failed attempt to disprove food stress was cause of cranes' death.

(a) Dr. Stroud.

In response to the necropsy reports, GBRA offered Dr. Richard Stroud who identified himself as a veterinary pathologist.⁸⁶ (Stroud, Day 6, Tr 6). He discussed the components of a diagnostic necropsy report. Id. Tr 23-26. He reviewed the autopsy reports for four crane carcasses, and offered his opinion that these birds did not die from malnutrition. Id. Tr 28-40. On cross-examination, however, Dr. Stroud admitted that the adult carcass, DX-118, was 25% below the normal weight of 6000 grams, and that it was emaciated, with no fat. Id. Tr 60. The juvenile bird, DX-119, died by predation; however, "severe emaciation" was also noted in the autopsy. Id. Tr 64. The third bird recovered was only a wing, and the fourth, only feathers. Dr. Stroud also agreed that the lack of food or starvation can lead to emaciation and that when a crane does not get adequate food and water, this can lead to infections and death. Id. Tr 45, 65. He agreed that a bird can acquire immune system problems and infection problems secondary to an already compromised body from emaciation or thirst. Id. Tr 45. He further affirmed that nutrition can be a factor in a compromised immune system. Id. In short, Dr. Stroud concurred

⁸⁶ Dr. Stroud's Curriculum Vitae ("CV") is DX-371.

with the most important point of these necropsy reports, which is that, when these birds died, they were emaciated, indicative of food stress.

The Court found Dr. Stroud evasive in response to questions of whether dehydration and lack of food source can contribute to compromising the host and lead to disease. (Stroud, Day 6, Tr 65-66, 74). He was confused about his basis for stating that alligators eat dead food in the wild. Id. Tr 67. And finally, until corrected by the Court, Dr. Stroud baselessly suggested that gangrene might be a cause of death of one of the necropsied cranes because the joint tissue was green in color. Id. Tr 31-33, 40, 47.

(b) Dr. Slack.

GBRA offered Dr. Douglas Slack to testify about crane habitat, behavior, and crane foraging ecology.⁸⁷ (Day 6, Slack, Tr 77). GBRA hired Dr. Slack in 2002 to study the San Antonio Guadalupe Estuarine System, and he is a lead author on the SAGES report. Intervenor GBRA and SARA paid 2.1 million to Dr. Slack and the SAGES team to answer the question “what do whooping cranes eat?” (Slack, Day 6, Tr 143). Dr. Slack employed a graduate student, Danielle Greer, (now Dr. Greer), to look at both food availability and a determination of what the whooping cranes were eating. Id. Tr 104-106. Greer made “hundreds of hours” of video-recordings of the cranes in the field, took notes while she was recording, and then obtained her primary data from analyzing the videotapes. Id. Tr 106-107. Greer claimed that cranes exhibited different behaviors in eating different kinds of food, and that she could determine what they were eating from observing their behavior on the tapes. Id. Tr

⁸⁷ Dr. Slack’s CV is filed at DX-370.

108. Greer focused on only three of the 200-plus Whooping Crane territories. Id. Tr 177. Based on Greer's observations, Dr. Slack and Greer concluded in the SAGES report that, even if blue crabs and wolfberries were not available in sufficient amount, the AWB flock would not be adversely affected because whooping cranes are omnivores. Id. Tr 118-120. The SAGES report was roundly criticized by Mr. Stehn and by the Texas Parks and Wildlife Department. PX-384; DX-394.

Dr. Slack testified that Dr. Greer had "intensive training" regarding how she determined from video recordings what food items cranes were eating, but admitted that he, her doctoral adviser, did not train her, and neither did Mr. Stehn or Dr. Chavez-Ramirez. Id. Tr 258-261. Dr. Slack then claimed that Dr. Greer had trained herself based on her experience in the field, and he heard her "talk about her evaluation and tapes," while in the laboratory. Id. Tr 263. But Dr. Slack admitted that Dr. Greer did not describe her methodology in her dissertation, and he is unaware of the technique she employed to discern what the cranes were eating. Id. Tr 265. Dr. Slack could not verify any of the food items Dr. Greer identified from watching the video recordings. Id. Tr 267. In one tape, Dr. Greer claimed to identify **900** food items, where Dr. Chavez-Ramirez, in reviewing the same segment, did not observe any.⁸⁸ Id. Tr 257.

Prior to being hired by GBRA in 2002, Dr. Slack employed and relied on the population counts and data collected by Mr. Stehn as the basis for his published articles. (Slack, Day 6, Tr

⁸⁸ Dr. Chavez-Ramirez reviewed about 12 hours of Greer's video recordings, (PX-237 to PX-244), and despite his years of field research, he could not identify with certainty any one food item being eaten by a crane. (See PX-386, Dr. Chavez-Ramirez' summary of his review). GBRA submitted DVD's of Dr. Greer's recordings. (See DX-313 through DX-328). The Court reviewed all of the recordings and found many of them to be unclear and out-of-focus. Indeed, Dr. Slack, who claimed to have watched 40-45 hours of the tapes, agreed that 10 to 20 percent were "fuzzy." (Slack, Tr 255). The Court was unable to determine what food item was being eaten, if any, by the cranes.

187-189). It was not until after he had been hired by GBRA, and subsequent to this litigation, that he authored, at GBRA's request, the "white paper," for the first time criticizing Tom Stehn's population and mortality counts. Id. Tr 189. In both the SAGES report and the white paper, Dr. Slack relied on the data of Greer. Id. Tr 277.

Dr. Slack did not personally spend any significant amount of time in the field, averaging one day per year over the past fifteen years. Id. Tr 95-96, 192-196. Contrary to the scientific literature, Dr. Slack testified that cranes did not need freshwater because they had functioning supraorbital salt glands which allowed them to secrete excess salt. Id. Tr 213. However, when questioned further by the Court, Dr. Slack admitted that he had no observational basis for this statement, he had not reviewed literature on cranes and freshwater, and that he "just made it up." Id. Tr 198-199, 207-208, 213, 215.

(c) Dr. Porter.

GBRA offered the testimony of Dr. Warren Porter, a professor of zoology and environmental toxicology at the University of Wisconsin, Madison.⁸⁹ (Porter, Day 7, Tr 17). He is developer of the "niche mapper" which is a computer model that allows for the calculation of food and water requirements for any animal on the planet. Id. Tr 19. Dr. Porter has not studied whooping cranes in the wild, although his graduate student studied whooping cranes in Necedah, Wisconsin during the summer. Id. Tr 38-39.

Dr. Porter's niche mapper considers the heat energy balance and the mass energy balance of an animal, and employs the "microclimate model" and the "endotherm model." Id. Tr 44-45. The microclimate model considers weather data such as temperature, wind speed, and humidity.

⁸⁹ Dr. Porter's CV is DX-420.

Id. at 45-47. The endotherm model considers the heat generated by the animal's metabolism. Id. Tr 48-49. The category of data he collected for the Whooping Crane model were: latitude and longitude; elevation to calculate solar radiation; air temperature, humidity, and wind speed at 6 feet elevation; ground surface reflectivity; soil properties; and minimum and maximum shade microclimates for every hour. Id. Tr 49-50. Dr. Porter used Dr. Greer's and Dr. Howard Hunt's⁹⁰ data concerning the AWB crane diet. Id. Tr 51. Dr. Porter did not use the data from Robert Porter Allen, Archibald, or Chavez-Ramirez. Id. Tr 58. His conclusion was that, no matter what the diet, AWB cranes "are always very comfortably in a positive energy balance by a long shot." Id. Tr 65.

Dr. Porter, showed a stunning lack of candor regarding his use of certain data. In determining which crane diet data to use, he claimed to have chosen the Greer and Hunt studies based on his review of the research. Id. Tr 39-40, 51. Upon further questioning, he could not recall if he or his students chose the crane diet data. Id. Tr 53, 55. He finally admitted that initially, he only used Greer's data, provided to him by GBRA, but then, after learning that Greer's data was being questioned as unreliable, he was provided with the Hunt study by GBRA. Id. Tr 80-81.

Dr. Porter had no personal experience studying cranes in the wild or observations about their feeding behavior on the Refuge. Id. Tr 38, 63. The Court concludes that the niche mapper

⁹⁰Hunt was a graduate student of Dr. Slack. (Slack, Day 7, Tr 84). Hunt's 1987 dissertation concerned cranes' movements following controlled burns of uplands. Id. Tr. 85. Hunt also studied the crane winter diet and published a fecal study with Dr. Slack as co-author. Id. Tr. 86, 96, 101. See DX-378. As part of his thesis, Hunt also measured the distance cranes would fly to freshwater ponds. Id. Tr 209. In short, Hunt's research confirmed the importance of blue crabs, wolfberries, and freshwater in the Whooping Crane diet.

model was of no value because it assumed food availability and did not address the energy expended by cranes when searching for food. Id. Tr 90-92.

G. Motion to reopen and the Abundance Survey.

On October 12, 2012, defendants and intervenors filed a motion to reopen the case to introduce into evidence a document entitled Aransas-Wood Buffalo Whooping Crane Abundance Survey (2011-12) (the “Abundance Survey”) that was generated by the USFWS. (D.E. 328). In advance of Mr. Stehn’s retirement, the USFWS appointed Dr. Brad Strobel, the lead author of the Abundance Survey, as the next Refuge biologist. In the winter of 2010-2011, Dr. Strobel trained with Mr. Stehn by accompanying him on census flights. However, in the winter of 2011-2012, Dr. Strobel implemented a new distance sampling survey method to estimate AWB crane populations. This distance sampling method is proposed in the Abundance Survey, and it was used during the 2011-2012 winter to estimate the AWB flock at the Aransas Refuge. (See D.E.328, Ex. 1, Abundance Survey at 11-14). After two years, Dr. Strobel is now leaving the Aransas Refuge to take a position at the Necedah National Wildlife Refuge in Wisconsin.

There is simply no comparison between Mr. Stehn’s 29-years, hands-on experience in the field at the Aransas Refuge studying the AWB cranes and his findings and conclusions, to the superficial conclusions presented in the Abundance Survey. The Court finds that the Abundance Survey lacks the necessary probative value to justify reopening the case because it: (1) addresses peak population counts rather than mortality (and Tom Stehn’s peak population numbers were never at issue); (2) is in conflict with evidence adduced at trial by both parties, which necessarily calls into question its reliability; (3) is preliminary and presents incomplete

information that has not been subjected to peer review; (4) lacks underlying data; and (5) proposes an unacceptable error rate.

1. Population versus mortality.

The Abundance Survey addresses the previous population counts by Mr. Stehn, and it proposes a future method for conducting population counts. It is not a criticism, nor even an evaluation of Stehn's *mortality* counts, nor does it develop any new methodology for determining winter AWB crane mortality. As previously noted, GBRA's expert, Dr. Conroy, found Stehn's peak population counts "reasonably accurate." (Conroy, Day 8, Tr 90). In response to defendants' and intervenors' motion to reopen, Dr. Chavez-Ramirez reviewed the Abundance Survey and offered his opinion as to its merits. (See D.E. 342, Ex. A, Declaration of Chavez-Ramirez). In his declaration, Dr. Chavez-Ramirez notes that the Abundance Survey does not propose a methodology to determine winter mortality of AWB cranes at the Aransas Refuge, nor does it offer any data on mortality during the 2011-2012 winter, let alone the winter of 2008-2009 when the alleged "take" of the AWB cranes occurred. (*Id.*, Chavez-Ramirez Dec. at ¶¶ 25-26). This is because "[s]tatistically based survey methods do not address mortality specifically." *Id.* at ¶ 26. Indeed, at the October 4, 2012 public meeting in Fulton Texas, Dr. Brad Strobel, lead author on the Abundance Survey, admitted that he did not know the winter mortality for AWB cranes during 2011-2012, the year of his study. (See D.E. 342, Ex. B, Declaration of TAP Regional Director Ronald B. Outen, authenticating video recording of October 4, 2012 public meeting and submitted as Exhibit 1 to his declaration). Thus, the Abundance Survey fails to address an essential issue at trial: Tom Stehn's methodology for

determining AWB crane mortality. As such, it provides neither relevant nor helpful information to the Court.

2. Information in Abundance Survey conflicts with trial evidence.

Two propositions advanced by the Abundance Survey conflict with facts developed at trial. First, it assumes, incorrectly, that Whooping Cranes are not territorial. Second, it criticizes Tom Stehn's past peak abundance surveys. These surveys were relied on by both parties at trial, and Mr. Stehn's underlying methodology in determining peak abundance remained basically unchallenged. Both of these propositions are contrary to the evidence adduced at trial by TAP and witnesses for the defendants and intervenors.

(a) Territoriality.

There is a bullet point in the Abundance Survey entitled: "Assumed Individuals Do Not Leave Their Territories" in which the authors question the territoriality of whooping cranes, stating that the the "assumption of territoriality is unnecessary and untenable given recent data." (D.E. 328-1 at 6). At trial, however, it was established that AWB cranes are highly territorial. Indeed, GBRA witness Dr. Conroy agreed that the AWB crane locations at the Aransas Refuge are largely predictable due to the established territories of the cranes, and that the territorial nature of the AWB cranes contributes to an accurate census. (Day 8, Conroy, Tr 137-138). One such exchange:

Q: You agree that as a general proposition the family groups and pairs have largely predictable locations due to their territoriality on the winter grounds.

A: I agree.

(Conroy, Day 8, Tr 130).

Dr. Slack testified at trial on behalf of the defendant GBRA and admitted that the SAGES report was premised on observing the AWB cranes in fixed and well-defined territories. (Slack, Day 6, Tr 116, 146, 156, 177-178). Moreover, in his October 25, 2011 deposition, Dr. Slack testified about AWB crane territoriality as follows:

Q: Now, with regard to life history, do whooping cranes have territories in the winter as well as on the breeding ground?

A: Yes.

Q: And could you describe what it means to – quote-unquote – have territory?

A: Territory is a defensive space.

(D.E. 342, Ex. H, Slack deposition excerpt at 70).

Both Dr. Archibald and Dr. Chavez-Ramirez confirmed Mr. Stehn's methodology for the identification of family groups, their territories, and mortality based on well-established and documented crane behavior: territoriality and family cohesiveness, as confirmed by banding. (Archibald, Day 1, Tr 73, 89, 95); (Chavez-Ramirez, Day 2, Tr 82-87); (Stehn, Day 2, Tr 294-95, 321-22, 328-29 and Day 3, Tr 37). Dr. Archibald pointed out established AWB crane territories at the Aransas Refuge, (see PX-10), and testified:

Q: So what does it mean to have a territory?

A: It means that this is an area that's a piece of real estate that a pair of cranes defends against the intrusion of other cranes. And we consider that to protect their food source.

A: ... And we found that the same birds come back to the same territories year after year, generally speaking.

Q: So it's literally like a piece of real estate that they have some ownership interest in.

A: Exactly. In addition, we found that their offspring, particularly the males, establish territories near their Parents' territory.

(Archibald, Day 1, Tr 93-94).

Dr. Chavez-Ramirez also testified as to the territorial behavior of AWB cranes:

Q: Okay. And this behavior has been long, you've personally observed such behavior of the one crane family unit defending its territory against another crane family unit wandering in?

A: That's correct. I've seen it multiple times.

(Chavez-Ramirez, Day 2, Tr 88).

Dr. Chavez-Ramirez testified that, as early as 1952, Robert Porter Allen described crane territorial behavior, although it was not identified as such. (Chavez-Ramirez, Day 2, Tr 88-89, confirming Allen's description of territorial defense on page 142 of PX-372). Equally as important, in his declaration, Dr. Chavez-Ramirez notes that he is not aware of any recent data that casts doubt or refutes this documented territorial behavior of AWB cranes. (D.E. 343, Ex. A, Chavez-Ramirez Dec. at ¶ 27). To the contrary, the Whooping Crane GPS tracking data that he has reviewed confirms territoriality in juveniles and paired adults at the Aransas Refuge. Id. at ¶ 29.

In their motion to reopen, defendants and intervenors attempt to equate crane territoriality with the faulty premise that cranes' do not venture beyond the boundaries of their territories, and suggest that Stehn's methodology relies on this faulty premise in determining mortality. However, not a single TAP witness testified that cranes do not leave their territories. Indeed, both Dr. Archibald and Dr. Chavez-Ramirez testified that, especially when food and freshwater resources are limited, cranes will seek out food on other crane's territories as well upland. (Archibald, Day 1, Tr 75-76, 91, 120, 125, 289); (Chavez-Ramirez, Day 2, Tr 115-116, 126-

127). Mr. Stehn expressly acknowledged that cranes leave their territories, leading him to develop strategies for counting those birds. (Stehn, Day 2, Tr 310-314). Further, Dr. Chavez-Ramirez specifically refutes the statement in the Abundance Survey that “individuals do not leave their territories,” and disputes that any biologist has previously relied on such an assumption. *Id.* at ¶ 22. Indeed, based on his own observations, Dr. Chavez-Ramirez has concluded that AWB cranes regularly leave and return to their territories, and that movements are increased “when conditions in that territory are not adequate, for example when the birds lack drinkable fresh water or sufficient food supplies. *Id.* at ¶¶ 24-25, ¶ 30. There is no evidence that Stehn based his methodology on cranes not leaving their territories.

(b) Peak Abundance.

Defendants *in toto* acknowledged that they are not challenging Mr. Stehn’s methods for estimating the AWB peak population counts. Mr. Fernandes, attorney for the GBRA, stated: “just so it’s real clear, we’re not moving to exclude Mr. Stehn’s population census counts, the two – the population census counts and the peak – the population census counts and the peak population counts that went from, you saw [TAP Exhibits] 270, 263, 283. We’re not moving to exclude him on those population counts.” (Fernandes, Day 2, Tr 300-301). The Abundance Survey criticizes Mr. Stehn’s peak abundance census; however, GBRA’s own expert, Dr. Conroy, confirmed that Mr. Stehn’s census methodology would produce a reasonably accurate peak flock number. He agreed that, if Stehn repeated four surveys, each with only a 75% detection rate, then he could have detected 99.6% of the individuals in the area combined in those four surveys. (Conroy, Day 8, Tr 140). He testified further:

Q: And do you believe that Mr. Stehn’s peak flock size estimates are an important conservation tool for the whooping cranes?

A: Yes, I do.

Q: And in your opinion, are Mr. Stehn's peak flock size estimates accurate?

A: I believe that they are reasonably accurate.

Q: And what is the basis of that belief?

A: The basis of that belief is my review of his methods and his statements that most cranes are – the conspicuous nature of the cranes, the fact that they're probably counting most of the cranes on each of these surveys and that when you roll all those numbers up together into a single number we are probably getting something close to the actual peak population size.

(Conroy, Day 8, Tr 89-90).

Dr. Conroy also acknowledged that the cranes' site tenacity contributed to the accuracy of Stehn's population counts:

Q: You agree that a census may be possible when the animals, or birds in this case, are known to have strong site tenacity. It is possible in that instance, correct?

A: It is possible.

Q: You agree that the putative census involves identifying and mapping boundaries of defended territories; that's kind of the core starting point for that, correct?

A: That's one method that's used, correct.

(Conroy, Day 8, Tr 127).

No credible evidence casts doubt on the accuracy of Mr. Stehn's peak abundance counts. The Abundance Survey's criticism of Mr. Stehn's data is unsupported, and in turn, undermines the credibility of the Abundance Survey itself as there is no basis for its conclusions.

(c) The Abundance Survey is preliminary.

Rule 803(8)(C), Fed. R. Evid., excepts from the hearsay rule reports compiled by "public offices or agencies" in compliance with the office or agency's duty under law "unless the

sources of information or other circumstances indicate lack of trustworthiness.” Fed. R. Evid. 803(8). Factors that may indicate a lack of trustworthiness include: “unreliability, inadequate investigation, inadequate foundation for conclusions, invasion of the jury’s province.” Distaff, Inc. v. Springfield Contracting Corp., 984 F.2d 108, 111 (4th Cir. 1993)(citation omitted). In addition, the Distaff court noted that “the inability of the defense to cross-examine the author on the conclusions in the report is not a reason for exclusion.” Id. at 112.

The Abundance Survey does not mask the fact it is not a final work product. Indeed, in the “message from the authors” section, the authors provide a disclaimer: “All data and conclusions contained in this report are preliminary and subject to revision.” (See D.E. 328, Ex. 1, Abundance Survey at 2). They note that “a formal Whooping Crane survey protocol is in development.” Id., Ex. 1 at 7. Dr. Chavez-Ramirez has reviewed the Abundance Survey and has commented that it is “a highly preliminary report, and it requires refinement. It lacks discussion or presentation of much of the underlying data, which would all be presented in a finished study.” (D.E. 342, Ex. A, Chavez-Ramirez Dec. at ¶ 10).

Tom Stehn’s peak abundance methodology was accepted in the scientific community, and indeed, was employed by the USFWS for over two decades as the sole means of evaluating the health and sustainability of the AWB flock. In contrast, the methods and protocols proposed in the Abundance Survey are still under development and have not yet been reviewed or even made available to any scientist except a small, internal group within the USFWS. (D.E. 342, Ex. A, Chavez-Ramirez Dec. at ¶ 11). Dr. Chavez-Ramirez, who is a member of the International Crane Recovery Team, has not been asked to review the Abundance Survey, nor has any other member of the Recovery Team. Id., Chavez-Ramirez Dec. at ¶ 12 -15. As admitted by the

Abundance Survey authors, their proposed survey protocol has not yet been “submitted to professional peer review to ensure that the methods are appropriate, scientifically defensible and professionally valuable.” (D.E. 328, Ex. 1, Abundance Survey at 7). Thus, at this point in time, the Abundance Survey has not yet been approved by the scientific community. In contrast, Tom Stehn’s methodology has been repeatedly subjected to peer review; his results have been replicated; the data collected has been relied on; and conclusions from that data have formed the basis of real policies that have positively affected the AWB flock numbers. The Abundance Survey provides no information relevant to the issues before the Court.

Courts have rejected draft or preliminary government reports because they do not demonstrate sufficient trustworthiness to satisfy Rule 803(8). See e.g. Anderson v. Westinghouse Savannah River Co., 406 F.3d 248, 264 (4th Cir. 2005) (affirming the district courts on the grounds that “the Department of Energy’s assessment was only a draft report”); Smith v. Isuzu Motors Ltd., 137 F.3d 859, 861-63 (5th Cir. 1998) (rejecting the admission of a governmental report because there was no case law “to allow the admission of the preliminary or interim evaluative opinions of agency staff members”). In Smith, the Fifth Circuit observed that “other circuits ... have held that interim agency reports or preliminary memoranda do not satisfy 803(8)(C)’s requirements.” Id. at 862 (collecting cases); Plemer v. Parsons-Gilbane, 713 F.2d 1127, 1140 (5th Cir. 1983) (noting that if administrative report is not final, it “may be considered untrustworthy” under 803(8)(C)); Coleman v. Home Depo, Inc., 306 F.3d 1334, 1342 n.4 (3d Cir. 2002) (stating that, in determining trustworthiness under 803(8)(C), courts may consider, *inter alia*, “the finality of the agency findings, *i.e.*, the state of the proceedings at which the

findings were made (whether they are subject to subsequent proceedings ...), and the likelihood of modification or reversal”).

Due to the preliminary nature of the Abundance Survey, and because defendants and intervenors have offered no underlying data or analysis to assess the document’s reliability or weight, the Court finds it is of no probative value. Further, the Court scheduled a hearing on defendants’ and intervenors’ motion to reopen case for January 14, 2013, so that it could question the authors about their theories, as it had done with Mr. Stehn. (D.E. 344). Defendants and intervenors were unable to produce these witnesses.

(d) No underlying data.

The Abundance Survey states that its purpose, in part, is to “describe the progression of work involved in building a credible survey program for this population of Whooping Cranes [AWB cranes] between 2010 through present (September 2012).” (D.E. 328, Ex. 1, Abundance Survey at 2). The Abundance Survey acknowledges that the USFWS has used aerial surveys for over 60 years, but then cautions that the surveys are “not important, in and of themselves,” but as “a tool to measure recovery and bolster conservation efforts.” *Id.* at 3. But of course, this is exactly what Tom Stehn did with the aerial surveys, and to suggest otherwise is no less than absurd. That aside, the Abundance Survey then offers a description of its new methods that were applied in the winter of 2011-2012. The authors propose: (1) primary and secondary sampling frames, with each “strata” composed of several “regions;” (2) a “peak” sampling time; (3) standardization by use of 2 observers and 1 pilot;⁹¹ and (4) standardization by flights at specific

⁹¹ At trial, Dr. Conroy agreed with TAP that a single observer is preferable to two or more because multiple observers would add variability. (Conroy, Day 8, Tr 134-135).

times of day. Id. at 8. Despite these proposed standardization techniques, nowhere in the Abundance Survey do the authors list the actual number of cranes counted for the winter 2011-2012, or the computations or analysis that led the authors to the conclusion that the peak flock in the “primary sampling frame” (“PSF”), an area identified for the survey, was 254. As such, it is impossible to verify this conclusion.

(e) Error rate of the Abundance Survey is unacceptable.

The Abundance Study authors state that one of the objectives of the report was to create a new annual peak abundance survey method “with precision enough to detect population declines” of the AWB flock. (D.E 328, Ex. 1, Abundance Survey at 7). Dr. Chavez-Ramirez notes that the new survey method employs a distance-based sampling technique to estimate a peak flock number within an unidentified area on the Aransas Refuge. (D.E. 342, Ex. A, Chavez-Ramirez Dec. at ¶ 17). Using the Abundance Survey results of 254 cranes and the suggested 12.6% variation coefficient, Dr. Chavez-Ramirez calculated the peak flock number to be as low as 198 birds and as high as 324 birds. Id., Chavez-Ramirez Dec. at ¶ 18. According to Dr. Chavez-Ramirez:

The very high error rate estimated to date with the new methodology will not provide information useful to fulfill Objective 1 of the International Whooping Crane Recovery Program because increases, or decreases, in the population would be difficult to detect from year to year. Thus, the sampling method currently under development needs to continue to be modified and refined before it will be useful. Right now, it is not a better alternative to the previous census method.

This Survey Report does not allow me as a member of the Recovery Team to determine if the population is increasing or decreasing. The recovery team has suggested that the error rate must be reduced to detect changes of 5%, and the Survey Report acknowledges they need to work towards this goal.

(D.E. 342, Ex. A, Chavez-Ramirez Dec. at ¶¶ 19-20.

Although TCQE defendants have not offered the Abundance Survey for purposes of the Court accepting this new methodology, the Court takes notice of Dr. Chavez-Ramirez's criticisms. The variation in these numbers is unacceptable. Mr. Stehn testified at trial that he observed approximately 95% of the AWB flock on any one aerial flight. (Stehn, Day 2, Tr 319). He opined that his error rate for his 2008-2009 population counts was 2-3%. (Stehn, Day 2, Tr 320-321). Dr. Chavez-Ramirez testified that the percentage of birds counted via Stehn's aerial flights was in the upper 90s to the mid-80s depending on the flight. (Chavez-Ramirez, Day 2, Tr 56-57). The Abundance Survey purports to offer a preferred, improved methodology to Tom Stehn's earlier work, but a comparison of the two methods reveals that Tom Stehn's labor-intensive census counting is more reliable and accurate than the Abundance Survey sampling. Having reviewed the Abundance Survey, the Court is even more certain of the accuracy and reliability of Tom Stehn's methodology for counting cranes and determining mortality of cranes in the AWB flock.

IV. INJUNCTIVE AND OTHER RELIEF.

A. The ESA allows for injunctive relief, and provides for a relaxed standard in granting it.

Absent a clear legislative statement to the contrary, the courts retain the power to order equitable relief. See Weinberger v. Romero-Barcelo et al., 456 U.S. 305 (1982). The issue under consideration in Weinberger was whether the language of the Federal Water Pollution Control Act ("Act") requires a district court to enjoin all discharges of pollutants that do not comply with the Act's permit requirements or whether "the district court retains discretion to order other relief to achieve compliance." Id. at 306-07. The Court noted that statutes providing

for particular grants of jurisdiction should be read against the backdrop of the courts' general ability to provide equitable relief. Id. at 313. Statutes should be read in this manner because the exercise of equitable relief reflects a "practice with several hundred years of history," that is one of which Congress is well aware. Id. Further, while Congress may guide or control the exercise of the courts' discretion, the Court does not "lightly assume that Congress has intended to depart from established principles." Id. (citations omitted). The Court then cited to a prior holding explaining the nature of the courts' equitable jurisdiction:

[T]he comprehensiveness of this equitable jurisdiction is not to be denied in the absence of a clear and valid legislative command. Unless a statute in so many words, or by a necessary and inescapable inference, restricts the court's jurisdiction in equity, the full scope of that jurisdiction is to be recognized and applied. 'The great principles of equity, securing complete justice, should not be yielded to light inferences of doubtful construction.'

Id. at 313 (internal citations omitted).

The Strahan court cited Weinberger as evidence that, in enacting the ESA, Congress did not intend to limit the courts' ability to fashion equitable relief. See 127 F.3d at 170 ("The ESA does not limit the injunctive power available in a citizen suit, and, thus, we understand the Act to grant a district court the full scope of its traditional equitable injunctive powers. 'Equitable injunction includes the power to provide complete relief in light of the statutory purpose.'") (citations omitted).

Rather than unequivocally restricting the courts' power to grant equitable relief, the ESA expressly authorizes it: "Except as [otherwise provided] any person may commence a civil suit on his own behalf-to enjoin any person, including the United States or any other governmental instrumentality or agency (to the extent permitted by the eleventh amendment to the Constitution), who is alleged to be in violation of any provision of [the ESA]." See 16 U.S.C.

1540(g)(1)(A). Furthermore, the ESA has been interpreted to provide for a relaxed standard in granting equitable relief: “When an injunction is sought under the ESA, the traditional balancing of equities is abandoned in favor of an almost absolute presumption in favor of the endangered species.” See Defenders of Wildlife v. Administrator, E.P.A., 688 F.2d 1334, 1355 (D. Minn. 1988), *aff’d in part and rev’d in part on other grounds* (citing Tennessee Valley Authority v. Hill, 437 U.S. 153, 173 (1978); Sierra Club v. Marsh, 816 F.2d 1376, 1383 (9th Cir. 1987)). The injunctive relief available under the ESA’s citizen-suit provisions is not intended to foreclose relief available under other law. Strahan, 127 F.3d at 170.155, 170 (1st Cir. 1997).

Several courts have also issued declarative relief for violations of the ESA pursuant to its citizen-suit provisions. See Florida Homebuilders Ass’n v. Norton, 469 F. Supp. 2d 1330 (M.D. Fla. 2007) (granting plaintiff’s request for declaration that defendant violated provisions of the ESA); see also Colorado River Cutthroat Trout v. Dirk Kempthorne, 448 F. Supp. 2d 170, 179 (D.D.C. 2006) (same); Florida Key Deer v. Stickney, 864 F. Supp. 1222, 1242 (declaring that FEMA must consult with USFWS within 30 days of entry of the order) (internal citations omitted); Alaska Fish & Wildlife Fed’n & Outdoor Council v. Dunkle, 829 F.2d 933, 937 (9th Cir. 1987); Alden v. Maine, 527 U.S. 706, 747 (1999) (“suits for declaratory or injunctive relief against state officers must therefore be permitted if the Constitution is to remain the supreme law of the land”); Franklin v. Massachusetts, 505 U.S. 788, 801-03 (1992) (discretionary relief appropriate even if not coercive, and any relevant change would require a “discretionary” government action).

B. An ITP is an appropriate remedy in this case.

Mr. Frederick discussed the process behind the Incidental Take Permit (ITP), noting that, after formulation of the ESA under President Nixon, unforeseen problems arose for private landowners and developers because they could not engage in their normal, lawful activities due to the broad language of the ESA. (Frederick, Day 5, Tr 81). To address this, Congress amended the ESA to add §10(a)(1)(B) to allow an applicant concerned that his or her activity might pose a threat or possible take of an endangered species, to apply for a ITP. Id. The ITP process “allows flexibility for economic gain by the public, as well as protecting endangered and threatened species.” Id. The ITP process involves creation of an HCP by the applicant, with involvement and advice from the USFWS. Id. Tr 81-82.

At first glance, the ITP process appears contrary to the goals of an HCP: it grants permission to conduct an activity that could be harmful to an endangered species, resulting in a “take.” (Frederick, Day 5, Tr 82-83). However, the ITP process is designed to provide some balance between the often conflicting interests of property owners, developers, and conservationists. (Frederick, Day 5, Tr 82-83). For example, in Austin, Texas, a purchaser of property buys a tract of land for ultimate commercial development. Id. Tr 83. The land is the habitat of two bird species: the black-capped vireo and the golden-cheeked warbler. Id. If the land owner develops the property, he will destroy the habitat of the birds, and as such, development of the property is prohibited under the ESA. Id. However, if the land owner applies for an ITP, the land owner will now work in partnership with the federal government, and all of the resources and information that it has available. Id. The ITP permit/HCP might propose that the land owner leave certain trees, or build after nesting season, etc. Id. That is, the HCP created in connection with the ITP will consider the biology and habitat of the endangered

species. Id. An ITP applicant can ask for assistance from scientists other than those employed by the USFWS. Id. Tr 84.

Federal courts have not been hesitant to order an ITP. The First Circuit recently addressed the incidental-take permitting process in Animal Welfare Institute v. Martin, 623 F.3d 19, 28 (1st Cir. 2010). The court noted the statutory provision:

Section 10 of the ESA provides, ‘The Secretary may permit, under such terms and conditions as he shall prescribe,’ any incidental taking otherwise prohibited by Section 9 that will not ‘appreciably reduce’ the likelihood that the species will survive and recover. 16 U.S.C. § 1539(a)(1)(B), (2)(B). While [US] FWS must issue a permit to any plan that meets its application requirements, 16 U.S.C. 1539(a)(2)(B), [US]FWS may alter application requirements as “necessary and appropriate,” 16 U.S.C. § 1539(a)(2)(A)(iv).

Id.

The parties in the Martin litigation entered into a consent decree that included very specific provisions as to how the Canadian lynx was to be protected from additional takes. Id. at 22 (citing district court opinion, Animal Welfare Institute v. Martin, 588 F. Supp. 2d 70, 76-77 (D.Me. 2008)). The district court provided a detailed description of the parties original consent decree, which required that the Commissioner impose very specific restrictions on trapping in particular areas. The consent decree was ordered to remain in effect “unless and until the [Fish and Wildlife Service] acts favorably on Maine's application for a federal ‘incidental take permit’ (ITP).” Id. at 23. The consent decree would also have expired if the Canadian lynx was delisted as an [endangered/threatened] species, or if the Fish and Wildlife Service promulgated a rule allowing incidental takes of Canadian lynx. Id. n. 4.

In Strahan v. Coxe, the First Circuit affirmed the lower court's order mandating that state-official defendants apply for an ITP. 127 F.3d at 158 (1st Cir. 1997) (affirming district

court's order to state-official defendants to apply for an incidental take permit and noting that “[t]he ESA does not limit the injunctive power available in a citizen suit, and thus, we understand the Act to grant a district court the full scope of its traditional equitable injunctive powers. ‘Equitable injunction includes the power to provide complete relief in light of the statutory purpose.’”) (citations omitted). The Strahan court also affirmed the order of the district court mandating that state-official defendants and plaintiff to participate in a collaborative effort See Strahan, 127 F.3d at 158 (where defendants were ordered to “convene an Endangered Whale Working Group and to engage in substantive discussions with the Plaintiff [Strahan], or his representative, as well as with other interested parties, regarding modifications of fixed-fishing gear and other measures to minimize harm to the Northern Right whales.”). Thus, there is sufficient precedent to support TAP’s proposed remedy of this Court ordering the TCEQ to participate in an ITP.

ITPs have had success protecting endangered species in the past. In Washington State, the ITP process was employed successfully concerning hundreds of thousands of acres of forest land, numerous large timber companies, and “a multitude of species on the [endangered] candidate list.” (Frederick, Day 5, Tr 84-85). The timber companies were required to pay for the HCP as well as for the monitoring. Id. Tr 85. “But at the end they walked away with surety about their production into the future and we [USFWS] walked away with an endangered species that was protected on that piece of land.” Id.

An ITP also does not put an applicant at risk. (Frederick, Day 5, Tr 95). Indeed, to not seek an ITP with the related HCP places the applicant at risk of violating federal law by taking

an endangered species.⁹² An HCP can be developed under a partnership agreement with stakeholder participation. Id. Tr 96. The development time for an HCP can be under a year, while larger plans with stakeholder participation can take up to 18 - 24 months. Id. at 97.

In this case, the actions of water diverters, such as GBRA and SARA as authorized by the TCEQ defendants, have adversely modified the AWB flock's critical habitat by diverting freshwater inflows, causing higher salinities in the San Antonio bay/Guadalupe estuary. (Frederick, Day 5, Tr 92). To avoid future prosecution, the TCEQ needs to apply for an ITP and develop a HCP to submit to the USFWS. Id. The HCP should include a provision to provide a higher volume of inflows to the estuary with monitoring of salinities at the bays to address the problem before the marsh becomes too saline. Id. Tr 92-93. Offering land would not address the problem. Id. Tr 93. The key issue at stake is the freshwater inflows into the Refuge: "Again, it's a voluntary effort by the applicant. However, I cannot foresee in any habitat conservation plan for this part of the world that would not include an increase in freshwater inflows." Id.

This assessment is corroborated by the USFWS Spotlight Species Action Plan, PX-25. The plan specifically identifies "decreases in freshwater inflows from water diversions and reservoir construction" as a threat to the survival of the Whooping Crane. Id. Tr 90. And see PX-25 at 1. The plan states that decrease in freshwater inflows threatens: (1) the cranes' main food items, blue crabs and wolfberry; and (2) freshwater availability. Id. Simply increasing the cranes' habitat would not address the problem because "without freshwater inflows to the bay it

⁹² There was no testimony as to whether or not the USFWS had advised the TCEQ that its actions might constitute a "take."

doesn't matter how much habitat you have..." Id. Tr 91. Salinity levels of the habitat must be kept lower than 23 ppt. Id. Mr. Frederick summarized:

But really the key to this whole thing, if I may expand, is the water. And just like the spotted owl in the Pacific Northwest, water salinity levels affect much more than the Whooping Crane and its food source, it affects everything in the estuary. So to me the number one thing in the plan is to work out something that during stressful times in the estuary there can be an increase in the inflows to keep these levels lower than they are. And from what I'm hearing, this year they're extraordinarily high because of the drought...

(Id., Tr 91-92).

The TCEQ defendants are experts in water transfer, and the USFWS would work with them to develop the HCP. Id. Tr 92. In addition to the HCP, there can be a recovery implementation plan, like with the Edwards Aquifer. Id. Tr 94. "Again, it's a voluntary effort by the applicant. However, I cannot foresee in any habitat conservation plan for this part of the world that would not include an increase in freshwater inflows." Id.

The Edwards Aquifer Recovery Implementation Program ("EARIP") grew out of litigation that required the USFWS to prepare a Habitat Conservation Plan (HCP) that placed pumping caps on the Aquifer. Mr. Andrew Sansom, who participated in early discussions involving EARIP, testified that "the hammer of federal involvement" helped make the program a success despite the diverse interests involved. (Sansom, Day 5, Tr 17).

There exist a number of other resources and programs available to address water management. The Texas Water Trust is an entity that was established to hold water in stream for environmental purposes. Id. Tr 26. If an entity has water to sell, it can be bought and deposited in the trust. Id. Tr 29. Recent Texas legislation may also provide a mechanism to ensure TAP's relief. Effective September 28, 2011, new Texas legislation grants to the Comptroller and TCEQ

defendants the authority to “develop or coordinate the development of a habitat conservation plan” and to “apply for and hold a federal permit issued in connection with a habitat conservation plan.” Tex. Gov’t Code § 403.452(a)(1)-(2). The authority was specifically granted in order to “promote compliance with federal law protecting endangered species.” Id. at § 403.452(a). Thus, the TCEQ defendants can be an applicant for an Incidental Take Permit under this provision, as long as they coordinate the application with the Comptroller. This legislation provides additional support for the ability of the TCEQ defendants to obtain a HCP, when coordinated with the Comptroller, and that funding may be obtained through the Comptroller’s office. Id. § 403.452(aq)(4)-(5). Indeed, the TCEQ has “the powers to perform any acts whether specifically authorized by this code or other law or implied by this code or other law, necessary and convenient to the exercise of its jurisdiction

Finally, there is also federal assistance available via the Natural Resources Damage Assessment (“NRDA”). (Sansom, Day 5, Tr 30. In the 1990s, NDRA money was used to purchase licenses from shrimp boat operators along the Gulf Coast in order to reduce the total number of shrimping licenses. Id. The shrimp license buy-back program created a limited entry into the fishery, thus reducing the overall catch effort in order to maintain the species. Id. Tr 30-31. Prospective NRDA funds might be available to the Texas coast to protect the bays and estuaries. Id. Tr 31. It is more difficult to procure water than land for environmental purposes. Id. Tr 35.

1. Dr. Sundig’s economic analysis

Dr. David Sunding, an economist at the University of California, Berkeley,⁹³ was hired by GBRA to do an analysis of “the economic impacts of changes in water availability to users in the GSA Basin, the Guadalupe-San Antonio Basin, that would result from imposition of a minimum instream flow requirement.” (Sunding, Day 8, Tr 185). He chose an instream flow requirement of 1.15 million acre-feet, which is slightly less than the 1.3 million acre-feet advocated by TAP. Id. Tr 185. He selected a 50-year time span, identified surplus water in agriculture, and the cost of building feasible projects.⁹⁴ Id. Tr 186. For example, in 2020, the cost of the instream flow requirement using 2011 dollars would be approximately 61 million dollars to the electric generating sector. Id. Tr 199. All sectors together, the loss was approximately \$251 million per year. Id. Tr 199. DX-253 reflects the present value of economic impacts for the 50-year time period calculated to be \$6.7 billion. Id. Tr 200.

On cross-examination, Dr. Sunding agreed that a HCP is a process that can help resolve conflicts between economic activity and harm to an endangered species. (Sunding, Day 8, Tr 203). He admitted that he did not read plaintiff’s original complaint, nor did he consider TAP’s experts concerning a HCP or recovery implementation plan. Id. Tr 204-06. He did not consider any of the economic benefits that the instream flow requirement would provide. Id. Tr 208. He agreed that consideration of the value of the AWB flock would be considered in a “comprehensive analysis.” Id. Tr 210.

IV. COURT’S ADDITIONAL FINDINGS OF FACT.

⁹³ Dr. Sunding’s CV is DX-244.

⁹⁴ Dr. Sunding’s conclusion are presented in DX-245.

Based on the evidence submitted at trial and reviewed above, the Court adopts as its own TAP's proposed findings of fact. (See D.E. 319 at 2-50). In summary, the Court finds that the actions, inactions and refusal to act by the TCEQ defendants proximately caused an unlawful "take" of at least twenty-three (23) Whooping Cranes in the 2008-2009 winter in violation of the ESA. TAP has established that during the winter of 2008-2009: (1) the TCEQ defendants diverted freshwater flow, caused higher salinity in the San Antonio Bay ecosystem; (2) higher salinities resulted in decreased freshwater availability, along with decreased blue crab and wolfberry abundance; (3) Whooping Cranes require freshwater, wolfberry and blue crab to survive; (4) the AWB flock suffered increased mortality as a direct result of diverted freshwater, leading to the deaths of at least twenty-three (23) cranes in total; (5) TCEQ defendants' water management practices altered the salinity of San Antonio Bay and the designated critical habitat of the AWB flock; and (6) TCEQ defendants have failed to insure the survival of the critical habitat of the AWB. The assertions of the SAGES report that the Whooping Crane can survive without freshwater, wolfberries and blue crab are not credible. The Court reiterates that TAP has successfully demonstrated causation.

TAP presented statistical analyses demonstrating an association and a correlation between seasonal freshwater inflows and Whooping Crane mortality. (Ensor, Day 1, Tr 234-252; Sass, Day 1, Tr 177-229). The evidence established that the TCEQ defendants' water management practices alter the salinity of San Antonio Bay and the designated critical habitat of the Whooping Crane. (Trungale, Day 3, Tr 251 - Day 4, Tr 50). Estuarine ecology is dependent on freshwater inflows and blue crab abundance is related to salinity. (Montagna, Day 3, Tr 171 - 250). Blue crabs and wolfberries are an important food source for the AWB cranes, and so is

freshwater; cranes can become malnourished, and die, due to significant salinity changes.

(Chavez-Ramirez, Day 1, Tr 252; Day 2, Tr 284). This sequential testimony demonstrates that the water management activities of the TCEQ caused a “take” of whooping cranes by altering their behavior through habitat modification, depriving them of food and water resources, and ultimately, leading to malnourishment and death.

The aerial counts on which TAP relies in presuming at least 23 cranes died in the winter of 2008-2009 is an accurate count and the best evidence available in estimating crane mortality. (Stehn, Day 2, Tr 285; Day 3, Tr 153). Mr. Stehn’s methodology for estimating the AWB crane population have been replicated and subject to peer review. Information related to both peak population and mortality counts have been published by the USFWS in the Whooping Crane Annual Reports. The annual reports are official USFWS documents. Defendants’/Intervenors’ Daubert challenge to Stehn’s methodology is overruled.

Dr. Chavez-Ramirez reviewed the locations and timing of crane mortalities in 2008-2009 and testified that their range-wide distribution spread throughout the winter did not indicate that any mass disease outbreak, or poisoning event such as a chemical spill, were likely causes. (Chavez-Ramirez, Day 2, Tr. 63-64, 66); PX-111(map); PX-32 (table); (Stehn, Day 3, Tr 31).

Following the AWB crane mortality of 2008-2009, GBRA, the largest commercial water supplier in the Basin, submitted a new water permit application for 189,000 acre-feet of water per year to be diverted from the Guadalupe. DX-248. Mr. Chenoweth admitted that, to the best of his knowledge, the TCEQ has never identified a target number specifically for San Antonio bay to protect the instream flows into the Bay. (Chenoweth, Day 5, Tr 234-35). He also admitted there is “no gauge requirement at the entrance to the bay saying how much water has to

get to the bay, there's not a single thing like that." Id. Tr 235. Mr. Chenoweth also admitted there is no maximum salinity requirement. Id. Tr 236. The Court finds that, in times of drought and other habitat stressors, the habitat may require up to 1.3 million acre-feet of freshwater inflows beginning well in advance of the Whooping Cranes' arrival in October to prevent the salinity of the habitat exceeding 20 ppt.

To date, TCEQ defendants have not used their authority to regulate diversions, to oversee riparian withdrawals, to secure returns, to release water from reservoirs, or to take other actions that would increase water flows with a purpose to protect the ABW flock. The TCEQ does not cancel unused water rights, even though the agency has this authority. (Vickery, Day 4, Tr 219; Soward, Day 4, Tr 273, 308). The TCEQ does not monitor D&L water use, nor does it even have a registry of such riparian rights, although nothing prevents it from doing so.

In addition, permit conditions could take into account the impact of diversions on the water needs in San Antonio Bay, and (by statute) must do so for permits within 200 river miles of the Bay. (Chenoweth, Day 5, Tr 158-159). The bay is more than 200 miles from the sources of the San Antonio River and the Guadalupe River and therefore the framework of S.B. 3 is ineffective to protect the Whooping Crane habitat. However, the TCEQ has not calculated a sustainable inflow number for the Guadalupe or San Antonio Bay, nor has it considered the impact of permits more than 200 miles upriver. The TCEQ has not mandated a gauge at the entrance to the bay to require instream flows, nor has it ordered that a certain salinity requirement be maintained. Id. Tr 163-164, 234-36.

The TCEQ could manage surplus water return flows in a manner to ensure that the return flows are preserved to flow into San Antonio Bay for environmental reasons, including for the

benefit of the AWB cranes. DX-397 at 17. Indeed, in the past, the TCEQ has exercised its authority to depart from the priority system for purposes not expressly specified by statute. For example, during the 2008-2009 time period, the TCEQ allowed the City of Kerrville to ignore the priority system. (Vickery, Day 4, Tr 224). The TCEQ has allowed certain oil and gas interests to obtain water in disregard of the priority system, although TCEQ later stopped these temporary permits following complaints from senior users. Id. Tr 224-25.

Despite the TCEQ defendants' protestations that they had no power to protect the AWB flock because their hands were tied by the "first in time, first in right" priority water system of Texas, the evidence, most of it from TCEQ officials, demonstrated that state-official defendants have certain powers to act under emergencies, although they have never used this power to take steps to protect the AWB flock. Indeed, the TCEQ has emergency authority to do anything that is necessary or appropriate to carry out duties and responsibilities, and this could extend to the protection of bays and wildlife. (Soward, Day 4, Tr. 266); DX-397 at 8-9). Furthermore, the TCEQ has the power and duty to abide by federal law and mandates. The Court finds that TAP has established by a preponderance of the evidence that there is a reasonably certain threat of imminent harm to the Whooping Crane that supports injunctive relief against the TCEQ defendants.

V. COURT'S CONCLUSIONS OF LAW.

From the facts, the Court concludes:

1. This Court has jurisdiction and the authority to grant the relief requested pursuant to 16 U.S.C. §§ 1540(c) & (g) (Endangered Species Act), 28 U.S.C. § 1331 (federal question), and 28 U.S.C. § 2201 *et seq.* (Declaratory Judgment Act).

2. The Endangered Species Act ("ESA") authorizes citizen suits, 16 U.S.C. § 1540(g), subject to certain requirements that TAP has satisfied.

3. Under 16 U.S.C. § 1540(g)(2)(A)(i), TAP notified the TCEQ defendants of their violations of the ESA and of TAP's intent to sue for those violations by certified letter sent on December 7, 2009 ("Notice Letter") (D.E. 1, Ex. 1). Defendants Shaw, Garcia, Rubinstein, Vickery, and Segovia and/or their authorized agents received the Notice Letter on December 9, 2009.

4. Plaintiff also gave notice of its intent to sue by sending the Notice Letter, on December 7, 2009, to Ken Salazar, Secretary of the Interior, and Sam Hamilton, Director of the USFWS, which was received on December 14, 2009.

5. More than sixty days have passed since the Notice Letter was served and the violations complained of in the Notice Letter are continuing and reasonably likely to continue to occur. The named Defendants have not taken any actions to remedy or prevent continued violations of the ESA. The Secretary of the Interior has not commenced an action to impose a penalty pursuant to 16 U.S.C. § 1540(a) and the United States has not taken any action to prevent continued violations of the Act.

6. Venue is appropriate in the Corpus Christi Division of the Southern District of Texas under the ESA, 16 U.S.C. § 1540(g)(3)(A), because alleged violations have occurred and will occur in this district. Venue is also appropriate in this district under 28 U.S.C. § 1391(b).

7. Congress enacted the ESA, 16 U.S.C. § 1531 *et seq.*, "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved... [and] to provide a program for the conservation of such endangered species and threatened species...." 16 U.S.C. § 1531(b).

8. Before a species receives critical protection under the ESA, the USFWS must list the species as either "threatened" or "endangered." 16 U.S.C. § 1533. (Admitted).

9. An "endangered species" is one that is "in danger of extinction throughout all or a significant portion of its range." 16 U.S.C. § 1532(6). (Admitted).

10. Nearly a half-century ago, whooping cranes first were listed under the Endangered Species Preservation Act of 1966 as threatened with extinction. 32 Fed. Reg. 4001. (Mar. 11, 1967). (Admitted).

11. Three years later they were listed as endangered. 35 Fed. Reg. 16047 (Oct. 13, 1970). (Admitted).

12. These listings were "grandfathered" into the ESA. 16 U.S.C. § 1531, *et seq.*, 87 Stat. 884.

13. Section 9 of the ESA, 16 U.S.C. § 1538(a)(1)(B), broadly prohibits “takes” of all listed endangered species, including the Whooping Crane. 50 C.F.R. § 17.31; 55 Fed. Reg. 26114 (June 26, 1990). (Admitted).

14. The term “take” is defined as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” 16 U.S.C. § 1532(18).

15. The term “harm” includes “significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.” 50 C.F.R. § 17.3. Babbitt v. Sweet Home Chapter of Communities for a Great Oregon, 515 U.S. 687 (1995) (upholding definition).

16. The term “harass” means “an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering.” 50 C.F.R. § 17.3.

17. Congress intended to define “take” in the “broadest possible manner to include every conceivable way” in which any person could harm or kill fish or wildlife. S. Rep. No. 307, 93rd Cong., 1st Sess. 1, reprinted in 1973 U.S. Code Cong. & Admin. News 2989, 2995.

18. Congress specifically intended that the ESA’s prohibition against “takes” governs the actions, and failure to act, by all “persons,” including any “officer, employee, agent, department, or instrumentality of ... any State.” 16 U.S.C. § 1532(13).

19. Each of the individual defendant officials of TCEQ, sued in their official capacities, are “persons” within the meaning of the ESA. 16 U.S.C. § 1532(13).

20. The Supremacy Clause of the U.S. Constitution, U.S. Const. art. VI, cl. 2, ensures that Section 9 of the ESA preempts contrary state regulations and other state laws. E.g., Lorillard Tobacco Co. v. Reilly, 533 U.S. 525, 540-41 (2001); Morris v. Jones, 329 U.S. 545, 553 (1947); Northern Sec. Co. v. United States, 193 U.S. 197, 347-48 (1904).

21. “The plain intent of Congress in enacting this statute was to halt and reverse the trend towards species extinction, whatever the cost.” When Congress enacted the ESA, it intended the Act to be as far-reaching as possible and to prevent any taking of an endangered species “whatever the cost.” TVA v. Hill, 437 U.S. 153, 184 (1978).

22. “Examination of the language, history, and structure of the legislation . . . indicates beyond doubt that Congress intended endangered species to be afforded the highest of priorities.” TVA v. Hill, 437 U.S. 153, at 174.

23. State agency regulations, to the extent they conflict with the ESA, are preempted, pursuant to the Supremacy Clause. E.g., Strahan v. Cox, 127 F.3d 155, 168 (1st Cir. 1997).

24. Courts routinely reject arguments against the Supremacy Clause predicated on a state official's purported lack of authority to comply with federal law. Washington v. Washington State Commercial Passenger Fishing Vessel Ass'n, 443 U.S. 658, 695-96, modified sub nom., Washington v. United States, 444 U.S. 816 (1979); North Carolina Board of Education v. Swann, 402 U.S. 43 (1971); Pacific Rivers Council v. Brown, 2002WL 32356431 (D. Or. Dec. 23, 2002); Seattle Audubon Society v. Sutherland, 2007 WL1577756, at *2 (W.D. Wash. May 30, 2007).

25. Cases uniformly recognize that, in appropriate circumstances, the ESA applies to suits involving state regulatory agencies.

26. The ESA prohibitions apply to actions by state agencies where their regulatory programs approve actions by third parties that contribute to causing the take. E.g., Strahan, 127 F.3d 155; Animal Welfare Inst. v. Martin, 623 F.3d 19 (1st Cir. 2010); Defenders of Wildlife v. EPA, 882 F.2d 1294 (8th Cir. 1988); Loggerhead Turtle v. County Council of Volusia County, 148 F.3d 1231 (11th Cir. 1998); Seattle Audubon Soc'y v. Sutherland, 2007 WL 1300964 (W.D. Wash. May 2, 2007); Animal Welfare Inst. v. Martin, 588 F. Supp. 2d 70 (D. Me. 2008).

27. These cases derive from a decision by the Fifth Circuit, that upheld liability in similar circumstances against a federal agency. Sierra Club v. Yeutter, 926 F.2d 429, 433-34, 439(5th Cir. 1991), followed in, e.g., Strahan, 127 F.3d at 163.

28. They implement the ESA prohibition that not only forbids a "take" but also forbids a person to "cause" a take to be committed. 16 U.S.C. §§ 1538(a)(1)(B), (C); 1538(g). More generally, Congress established that sometimes otherwise lawful activities can cause a take of a listed species if they are specifically exempted. 16 U.S.C. § 1539. This is known as an "incidental take."

29. More generally, Congress established that sometimes otherwise lawful activities can cause a take of a listed species if they are specifically exempted. 16 U.S.C. § 1539. This is known as an "incidental take."

30. The ESA prohibits such incidental takes, with an important exception: To avoid liability for a "take" caused by otherwise lawful activities, in some circumstances, Congress authorized responsible persons to seek an ITP pursuant to section 10 of the ESA. 16 U.S.C. § 1539(a).

31. The ITP is issued by USFWS after development and submission of a HCP which must be approved by the USFWS. 16 U.S.C. § 1539(a)(2)(A); (B).

32. The HCP must include conservation measures designed to minimize and mitigate the impacts of taking species listed under the Act. 16 U.S.C. § 1539(a)(2)(A)(ii).

33. In the absence of an ITP or other exemption, the ESA forbids each and every take. 16 U.S.C. § 1538(a)(1).

34. The ESA expressly authorizes injunctive relief against any “person” alleged to be responsible for a take, or otherwise in violation of the ESA, including any governmental instrumentality or agency. 16 U.S.C. § 1540(g)(1).

35. As the U.S. Supreme Court has held, Congress has accorded the protection of endangered species the highest of priorities, so courts do not have the discretion to withhold injunctive relief where it is necessary to prevent an imminent and likely violation of the ESA. Tennessee Valley Auth., 437 U.S. at 184.

36. A Court must issue an injunction if a plaintiff establishes by a preponderance of the evidence that there is “a reasonably certain threat of imminent harm to a protected species.” Defenders of Wildlife v. Bernal, 204 F.3d 920, 925 (9th Cir. 2000).

37. Declaratory relief is authorized by 28 U.S.C. § 2201 & 2202.

38. TAP has satisfied the requirements of Article III standing because it has established injuries of its members which are fairly traceable to the TCEQ defendants’ actions and inactions and because the requested relief will redress those injuries. Lujan v. Defenders of Wildlife, 504 U.S. 555, 560-61 (1992) (environmental standing); Hunt v. Washington State Advertising Commission, 432 U.S. 333, 343 (1977) (associational standing).

39. TCEQ defendants have broad powers over surface waters, including the San Antonio and Guadalupe rivers at issue in this case.

40. Texas agencies are creatures of statute. Tex. Natural Res. Conservation Comm’n v. Lakeshore Util. Co., 164 S.W.3d 368, 377-78 (Tex. 2005).

41. TCEQ’s primary organic statute is Chapter 5 of the Texas Water Code, which creates the agency and defines its duties, powers and areas of jurisdiction.

42. The general powers of the TCEQ are stated: “The commission has the powers to perform any acts whether specifically authorized by this code or other law or implied by this code or other law, necessary and convenient to the exercise of its jurisdiction and powers as provided by this code and other laws.” Tex. Water Code § 5.102(a).

43. The TCEQ defendants’ general powers extend to “any acts” that may be “authorized” or “implied” by the Water Code or by “other laws” – including the ESA – while they perform their duties and exercise their jurisdiction. Tex. Water Code § 5.102(a).

44. When the Texas Legislature confers agency power, it impliedly intends that the agency has whatever powers are reasonably necessary to fulfill its express functions or duties.

Tex. Natural Res. Conservation Comm'n v. Lakeshore Util. Co., 164 S.W.3d 368, 378 (Tex. 2005).

45. Texas “[s]tatutes are given a construction consistent with constitutional requirements, when possible, because the legislature is presumed to have intended compliance with state and federal constitutions.” Brady v. Fourteenth Court of Appeals, 795 S.W.2d 712, 715 (Tex. 1990); Tex. Gov’t Code § 311.021.

46. Moreover, TCEQ “has general jurisdiction over...water and water rights including the issuance of water rights permits, water rights adjudication, cancellation of water rights, and enforcement of water rights.” Tex. Water Code § 5.013(a)(1).

47. This regulatory authority is subject to a specific statutory mandate: TCEQ “shall administer the law so as to promote the judicious use and maximum conservation and protection of the quality of the environment and the natural resources of the state.” Tex. Water Code § 5.120.

48. These provisions of the Water Code establish TCEQ’s “authorized” and “implied” powers to protect endangered species, at least to avoid violations of the ESA.

49. The power and duty of TCEQ officials to comply with federal laws such as the ESA also is explicitly recognized by their oath of office. See Tex. Const. Article XVI, § 1(a) (duty to preserve, protect, and defend the Constitution and laws of the United States); Tex. Gov’t Code § 601.005.

50. State law also grants TCEQ authority to regulate broadly; it can “adopt any rules necessary to carry out its powers and duties under this code and other laws of this state.” Tex. Water Code § 5.103(a).

51. One such rule adopted by TCEQ relates to the South Texas Watermaster. Specifically, during times of water shortage, TCEQ grants the South Texas Watermaster broad authority to cancel or modify declarations of intent to divert or impound water, order pass-through and releases of impounded water, order diverters to limit or cease diversions, or take any other action “necessary to ensure that downstream senior water rights, demands for domestic and livestock purposes, minimum stream flow requirements, minimum release requirements, and other conditions, are administered in accordance with applicable laws.” 30 Tex. Admin. Code § 304.21(c).

52. This rule does not limit what is meant by “other conditions,” or by “applicable laws,” and is consistent with the above-described statutory power for TCEQ to remedy a violation of the ESA, here a prohibited take of whooping cranes.

53. TCEQ’s powers must be understood in light of foundational provisions of Texas Water law.

54. The surface water at issue “is the property of the state.” Tex. Water Code § 11.021(a).

55. “The waters of the state are held in trust for the public.” Tex. Water Code § 11.0235(a).

56. No person may divert, store or impound state-owned water without authorization, by permit, certificate of adjudication, or one of the limited statutory exemptions. Tex. Water Code §§ 11.081; 11.121.

57. No TCEQ defendant, nor any other defendant, holds or benefits from an ITP, and there is no other exemption that might authorize a taking of a Whooping Crane.

58. Section 9 prohibits indirect as well as deliberate “takes” of endangered species. Sweet Home, 515 U.S. at 700, see also Strahan, 127 F.3d at 163.

59. Ordinary requirements of proximate causation apply to ESA cases. Sweet Home, 515 U.S. at 700, n.13 (O’Connor J., conc.); see also, e.g., Loggerhead Turtle v. County Council of Volusia County, 148 F.3d 1231, at 1251 n.23 (11th Cir. 1998) (citing Cox v. Administrator United States Steel & Carnegie, 17 F.3d 1386, 1399 (11th Cir. 1994)) (“proximate cause is not the same thing as a sole cause”).

60. Proximate causation exists where a defendant government agency authorized the activity that caused the take. See, e.g., Strahan v. Coxe, 939 F. Supp. at 979; Loggerhead Turtle v. County Council of Volusia County, 148 F.3d 1231, 1247-53 (11th Cir. 1998).

61. But-for the regulatory and permitting scheme overseen by the TCEQ defendants, no state-owned water could be legally diverted, impounded or consumed.

62. Insofar as TCEQ defendants dispute whether they can be held liable for a “take” of Whooping Cranes, and also dispute that they are liable for a “take” of Whooping Cranes, the parties’ disputes concerning application of the ESA establishes the predicate for declaratory relief: “a substantial controversy, between parties having adverse legal interests, of sufficient immediacy and reality to warrant the issuance of a declaratory judgment.” Maryland Casualty Co., v. Pacific Coal & Oil Co., 312 U.S. 270, 273 (1941); accord, e.g., Golden v. Zwickler, 394 U.S. 103, 108 (1969).

63. Declaratory relief serves the purpose of clarifying the legal duties and obligations in a controversy. E.g., Refinery Holding Co., L.P. v. TRMI Holdings, Inc., 302 F.3d 343, 349 n.4 (5th Cir. 2002); Sherwin-Williams Co. v. Holmes County, 343 F.3d 383, 390 n.2 (5th Cir. 2003).

64. To the extent TCEQ defendants argue that they can continue to implement a regulatory scheme that violates the ESA, a declaration can help redress the injury. E.g., Alaska Fish & Wildlife Fed’n & Outdoor Council v. Dunkle, 829 F.2d 933, 937 (9th Cir. 1987); see also, e.g., Alden v. Maine, 527 U.S. 706, 747 (1999) (“suits for declaratory or injunctive relief

against state officers must therefore be permitted if the Constitution is to remain the supreme law of the land”); Franklin v. Massachusetts, 505 U.S. 788, 801-03 (1992) (discretionary relief appropriate even if not coercive, and any relevant change would require a “discretionary” government action).

65. Based on the Findings of Fact set forth above, the TCEQ defendants can be and are liable for a “take” of the whooping cranes under Section 9 of the Endangered Species Act. 16 U.S.C. §§1538(a)(1)(B), (C); 1538(g); see also Sierra Club v. Yeutter, 926 F.2d 429 (5th Cir.1991); Strahan, 127 F.3d 155 (1st Cir. 1997); Animal Welfare Inst. v. Martin, 623 F.3d 19 (1st Cir. 2010); Defenders of Wildlife v. EPA, 882 F.2d 1294 (8th Cir. 1988); Loggerhead Turtle v. County Council of Volusia County, 148 F.3d 1231 (11th Cir. 1998).

66. Based on the Findings of Fact, it is appropriate for the Court to Order the TCEQ defendants to seek a Habitat Conservation Plan that could lead to an Incidental Take Permit. 16 U.S.C. § 1539(a); Strahan v. Coxe, 127 F.3d at 158 (affirming the district court’s order to Massachusetts officials to obtain an Incidental Take Permit); Animal Prot.Inst. v. Holsten, 541 F. Supp. 2d 1073, 1081–82 (D.C. Minn. 2008) (ordering defendant state agency to apply for an Incidental Take Permit); Sweet Home, 515 U.S. at 700-701 (this form of relief also is consistent with the Congressional purposes for Incidental Take Permits, as discussed by the Supreme Court).

67. There is no legal basis for defendants’ and intervenors’ additional challenges to this Court’s authority to grant relief.

68. Because TAP seeks only prospective declaratory and injunctive relief, and not damages, the Eleventh Amendment presents no bar to suit. Ex Parte Young, 209 U.S. 123 (1908); Strahan v. Coxe, 127 F.3d at 166.

69. There is no legal basis for this Court’s abstention under Burford v. Sun Oil Co., 319 U.S. 315 (1943).

70. TAP’s proposed relief does not “offend” any cooperative approach between the Federal and State government to endangered species protection, which concerns ESA Section 6 agreements, none of which have been made in this case. See 16 U.S.C. § 1535.

71. TCEQ is an agency receiving funds through Article VI (Natural Resources) of the 2012-2013 appropriations bill, and therefore may undertake the functions identified in Texas Government Code Section 403.452(a)(1), (2), (3), (5), or (6). Tex. Govt. Code §403.453(a)(5); GENERAL APPROPRIATIONS ACT FOR THE 2012-13 BIENNIUM, at VI-16, Acts 2011, 82nd Leg., 1st C.S. (HB1), available at http://www.lbb.state.tx.us/Bill_82/GAA.pdf.

72. Pursuant to state law, TCEQ has the power to develop or coordinate the development of a Habitat Conservation Plan. Tex. Govt. Code § 403.452(a)(1).

73. State law authorizes TCEQ specific powers “[t]o promote compliance with federal law protecting endangered species.” Tex. Govt. Code § 403.452(a).

74. Pursuant to state law, TCEQ has the power to apply for and hold a federal permit issued in connection with a Habitat Conservation Plan. Tex. Govt. Code § 403.452(a)(2).

75. Pursuant to state law, the TCEQ has the power to impose or provide for the imposition of a mitigation fee in connection with a Habitat Conservation Plan. Tex. Govt. Code § 403.452(a)(5).

76. Pursuant to state law, the TCEQ has the power to implement, monitor, or support the implementation of a Habitat Conservation Plan. Tex. Govt. Code § 403.452(a)(6).

77. The TCEQ has “the powers to perform any acts whether specifically authorized by this code or other law or implied by this code or other law, necessary and convenient to the exercise of its jurisdiction and powers as provided by this code and other laws.” Texas Water Code § 5.102(a).

78. Pursuant to statute, the TCEQ “has general jurisdiction over...water and water rights including the issuance of water rights permits, water rights adjudication, cancellation of water rights, and enforcement of water rights.” Tex. Water Code § 5.013(a)(1).

79. The TCEQ “shall administer the law so as to promote the judicious use and maximum conservation and protection of the quality of the environment and the natural resources of the state.” Tex. Water Code § 5.120.

80. There is extensive statutory authority for the TCEQ defendants’ authority to regulate the surface waters of the State of Texas. *See* Tex. Water Code §§ 5.102; 5.120; 11.021; 11.022; 11.081; 11.121-.124, 11.142; 11.143; 11.171-.186.

81. In Texas, surface water rights are usufructuary, giving an owner only a right of use, not complete ownership. Edwards Aquifer Auth. v. Day, 369 S.W.3d 814 (Tex. 2012). 2012).

82. Critical habitat is defined by the ESA as the specific areas within the geographical area occupied by the species, at the time it is listed, on which are found those physical or biological features that (1) are essential to the conservation of the species, and, (2) may require special management considerations or protections. It includes also specific areas outside the geographical area occupied by the species at the time it is listed, if the Secretary determines that such areas are essential for the conservation of the species. 16U.S.C. § 1532(5)(A)(i)–(ii).

83. Plaintiff is the prevailing party in this matter, and is entitled to an award of its reasonable attorney’s fees and costs, as well as expert witness fees, incurred in this action. See 16 U.S.C. § 1540(g)(4).

84. Courts have awarded reasonable attorneys fees in ESA cases. See, e.g., Center for Biological Diversity v. Marina Point Development Associates, 446 F. App'x 843, 845-46(9th Cir. 2011); Florida Key Deer v. Board of County Com'rs for Monroe County, F. Supp. 601, 603-04 (S.D. Fla. 1991).

VI. DECLARATORY RELIEF, ITP, AND HCP ORDERED.

The Court finds that this case is well-suited for an ITP and corresponding HCP. The preparation of an HCP would require the TCEQ defendants to address freshwater flows, and reduce and mitigate adverse impacts of water diversions and related practices on the AWB crane population. (Sansom, Day 5, Tr. 44-45; Frederick, Day 5, Tr 90-91). The HCP would identify how the TCEQ defendants would achieve goals related to inflows and protection of the AWB cranes. (Frederick, Day 5, Tr 93). The HCP process allows flexibility by protecting economic interests of stakeholders while also protecting the endangered species. Id. Tr 81. The USFWS guides the applicant through the process. Id. The HCP process is flexible. Id. Tr 86.

The Court holds that, based on the above Findings, the TCEQ defendants are liable for a “take” of the AWB cranes under Section 9 of the Endangered Species Act. 16 U.S.C. §§ 1538(a)(1)(B), (C); 1538(g); see also Sierra Club v. Yeutter, 926 F.2d 429 (5th Cir. 1991); Strahan, 127 F.3d 155 (1st Cir. 1997); Animal Welfare Inst. v. Martin, 623 F.3d 19 (1st Cir. 2010); Defenders of Wildlife v. EPA, 882 F.2d 1294 (8th Cir. 1988); Loggerhead Turtle, 148 F.3d 1231 (11th Cir. 1998). Thus, it is appropriate for the Court to Order the TCEQ defendants to seek an Incidental Take Permit pursuant to section 10(a) of the ESA, as well as a corresponding Habitat Conservation Plan. 16 U.S.C. § 1539(a); Strahan, 127 F.3d at 158 (affirming the district court’s order to Massachusetts officials to obtain an Incidental Take Permit); Animal Prot. Inst. v. Holsten, 541 F. Supp. 2d 1073, 1081–82 (D.C. Minn. 2008) (ordering defendant state agency to apply for an Incidental Take Permit); see also Sweet Home,

515 U.S. at 700-701 (this form of relief also is consistent with the Congressional purposes for Incidental Take Permits, as discussed by the Supreme Court). This ordered relief does not interfere with any cooperative approach between the Federal and State governments to protect endangered species, (section 6 ESA agreements), and none of have been made in this case. See 16 U.S.C. § 1535.

Thus, it is therefore **DECLARED** that:

(1) The TCEQ, its Chairman, and its Executive Director have violated section 9 of the ESA, and continue to do so through their water management practices which include the decision to not monitor D&L users or to exercise emergency powers available to protect the endangered whooping cranes; and

(2) Texas water diversion regulations promulgated by the TCEQ, its Chairman, its Executive Director, and the Texas legislature are preempted by federal law when they purport to authorize water diversions that result in a taking of whooping cranes.

Therefore, it is **ORDERED** that:

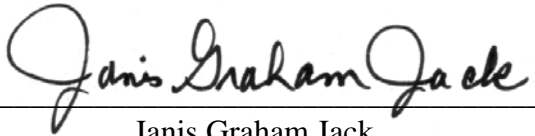
(1) The TCEQ, its Chairman, and its Executive Director are enjoined from approving or granting new water permits affecting the Guadalupe or San Antonio Rivers until the State of Texas provides reasonable assurances to the Court that such permits will not take Whooping Cranes in violation of the ESA.

(2) Within thirty (30) days of the date of entry of this Order, the TCEQ, its Chairman, and its Executive Director shall seek an Incidental Take Permit that will lead to development of a Habitat Conservation Plan. See 16 U.S.C. § 1539(a); 50 C.F.R. § 17.22(b) (listing requirements for an Incidental Take Permit).

The Court will retain jurisdiction over this action during the formulation of the HCP process.

The Court finds that Plaintiff TAP is the prevailing party in this matter, and is entitled to an award of its reasonable attorney's fees and costs, as well as expert witness fees, incurred in this action. See 16 U.S.C. § 1540(g)(4).

SIGNED and ORDERED this 11th day of March, 2013.



Janis Graham Jack
Senior United States District Judge

COURT'S EXHIBIT 1: MAP OF AWB CRANES' HABITAT

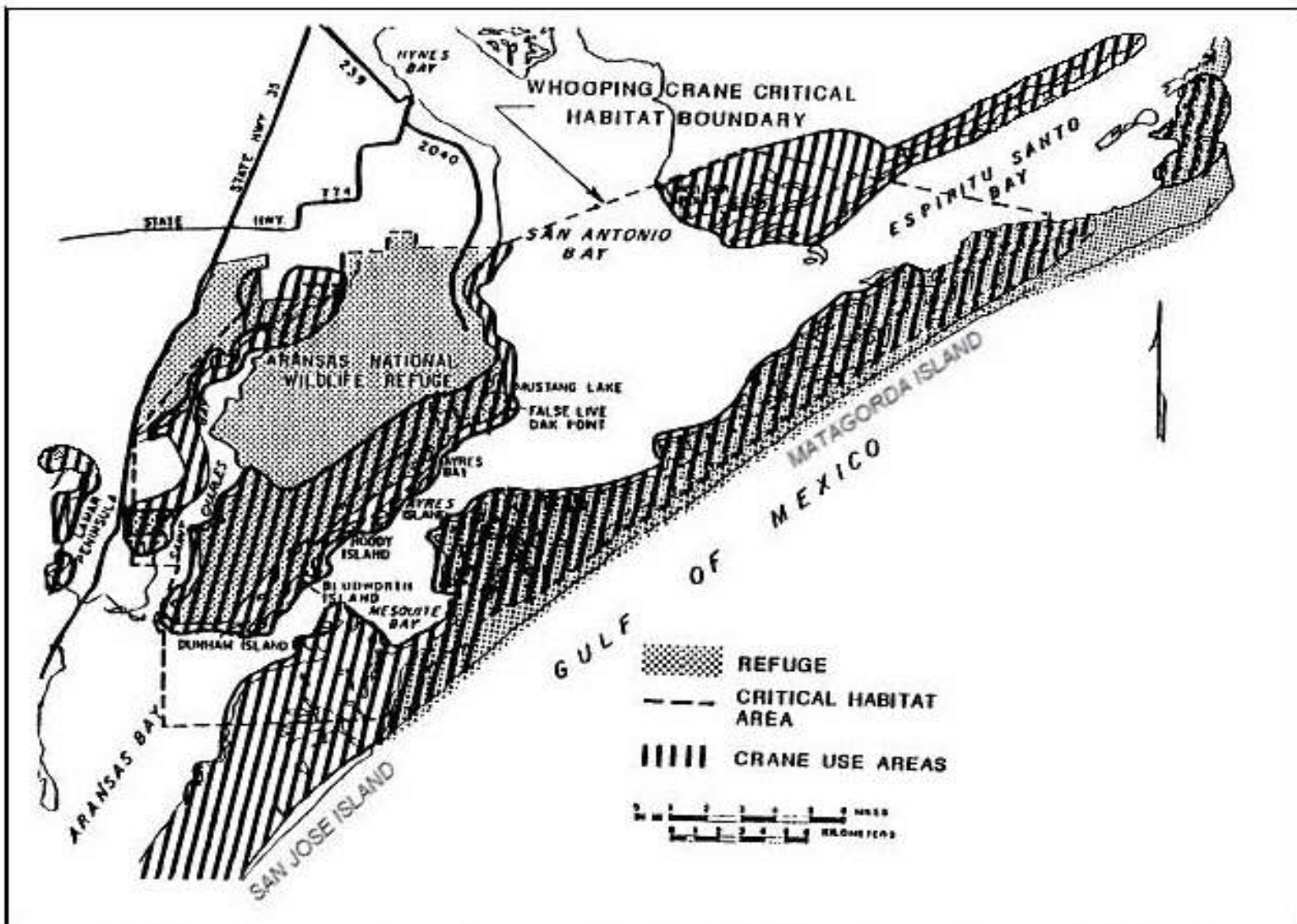


Figure 1. Wintering area of the Aransas Wood Buffalo Population, Aransas National Wildlife Refuge and Critical Habitat boundary on the Gulf of Mexico coast of Texas. (Data Source: U.S. Fish & Wildlife Service, International Recovery Plan, Whooping Crane (*Grus americana*), Third Rev., March 2007, page 15).

(PX-1, Exhibit 1)